NATURE MAGAZINE

JULY 1924

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THE TREE PLANTING ARMY

Now world wide, this army of good citizens, some of whom are recorded here, makes for international friendliness and good will.
—Charles Lathrop Pack, President, American Tree Association

War mothers of Colorado Springs will transform Boulder Park into a memorial park by planting 52 memorial trees.

Three thousand Boy Scouts of Philadelphia planted treets this spring and are signing up the application blanks for membership in the tree-planting army.

Boy Scouts of York, Pa., have planted a memorial tree in honor of Woodrow Wilson. This was part of a program that included the planting of 1,200 trees.

At Dayton, Ohio, the Chamber of Commerce gave prizes for the best papers on tree planting. At the same time the *Dayton Herald* conducted a tree-planting campaign and hundreds of tree planters joined the American Tree Association.

Tree planters are in every country. Prof. L. Kuentz of the college at Bizerta, Tunisia, North Africa, and Rev. John J. Banninga of the Union Theological Seminary, Pasumalia, South India, have joined the American Tree Association.

An application from China for membership in the American Tree Association has been received from Clara Husted Wolfe and Jesse B. Wolfe, graduates of Oberlin College, who planted trees in memory of Oberlin. The applications were the first to be signed in Chinese by the witness to the tree planting.

Sportsmen's associations everywhere see the value of tree planting. At Cortland, N. Y., 5,200 trees were planted with the cooperation of school children under the direction of John A. McDermott, president of the Cortland County Sportsmen's Association, who outlined the value of tree planting to the pupils of eleven schools before the work was started.

Another membership in the tree-planting army from China is that of Charles A. Leonard, Shantung.

The Pioneer Club of the Y. M. C. A. at Gloversville, N. Y., planted 2,000 trees during a two-day outing.

Governor Donahey of Ohio has joined the American Tree Association by planting a tree. In his proclamation the governor called special attention to nut tree planting.

Lady Seaforth of Brahan Castle, Canon Bridge, Rosshire, Scotland, and Mrs. Henderson of 18 Rutland Gate, S.W., London, are the most recent members in the tree-planting army from Great Britain.

The Waverly Woman's Club of Waverly, Ill., has planted a Community Christmas Tree and poined the American Tree Association in a body. Mrs. H. E. Funk and Mrs. J. B. Lombard signed the application.

A memorial tree for Madge Morris, the poet, has been planted in the yard of the former home of Edwin Markham at San Jose. Mrs. Bertha Marguerite Rice was chairman of the committee and Mrs. Frona Eunice Wait Colburn, president of the San Francisco branch of the League of American Pen Women, spoke.

One of the banner tree-planting programs of the spring reported to the American Tree Association is that in Broome County, N. Y. With Binghamton as headquarters the Broome County Sportsman's Association put on a big campaign. The hundred schools, having 25,000 tree planters, started early and worked all day. It is estimated 80,000 trees were planted. The Girl Scout and Boy Scout organizations cooperated.

Ten schools in Concord, N. H., answered Governor Brown's Arbor Day proclamation by planting trees.

In conjunction with their Flag Day exercises, Paterson Lodge No. 60, B.P.O. Elks, planted a memorial tree for the lodge's World War heroes.

At Larned, Kans., Daughters of the American Revolution planted trees in honor of Warren G. Harding and Woodrow Wilson.

Directed by Scout Executive Barrett, Boy Scouts of Lockport, N. Y., planted 2,000 white pines in Sutliff-Rotary Park given to the scouts by the Rotary Club.

Gov. R. A. Nestos of North Dakota, planted a "Mother's Tree," a white birch, at Bismarck and issued a proclamation for tree planter in honor of the mothers of the land.

At Fayetteville, N. Y., 525 school pupils planted 8,000 trees on two acres given to the school for demonstration purposes. Principal Rutherford directed the work, aided by the Boy Scouts.

In 1877 the Seniors of the University of Kansas planted a memorial grove, and afterward it was named in honor of Chancellor Marvin, who made the suggestion at that time. This is one of the earliest college plantings known to the American Tree Association.

The only way to join the American Tree Association is to plant a tree and register it with the Association, 1214 Sixteenth Street N.W., Washington, D. C. The Association will send tree-planting suggestions and a tree-day program for two cents to pay postage. Make your fall tree-planting plans now.

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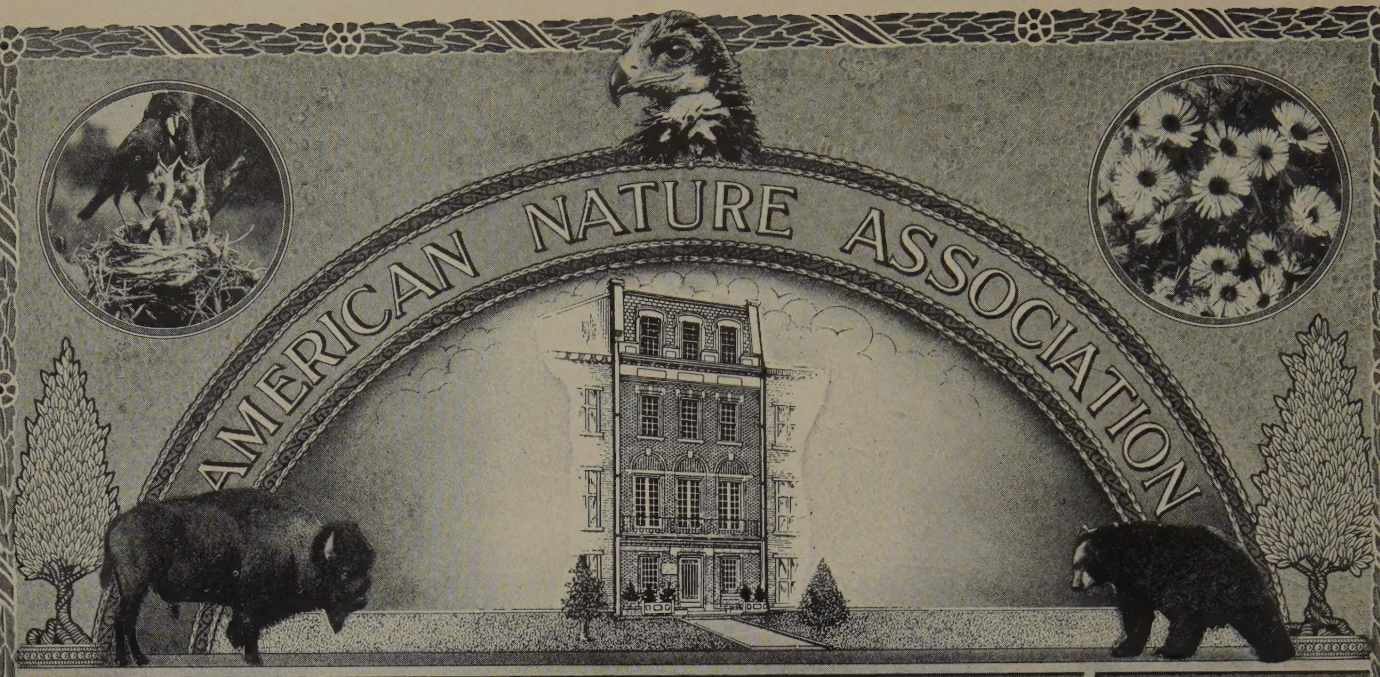

WASHINGTON, D. C.

Organized to stimulate public interest in every phase of Nature and the Out of Doors, and devoted to the practical conservation of the great Natural Resources of America

Officers

CHARLES LATHROP PACK, PRESIDENT — PERCIVAL SHELDON RIDSDALE, TREASURER — ARTHUR NEWTON PACK, SECRETARY

NATURE MAGAZINE

AT LAST, an adequate meeting-place has been provided for the Fraternity of the Great Outdoors. NATURE MAGAZINE has come in answer to a long-felt want - a monthly magazine where the child and the grown-up alike may revel in pictures and stories of birds, trees, beasts, fish, plants and other living, breathing evidence of the Creator's handiwork.

To every man, woman and child who thrills to the chirp of birds, to the friendly wag of a dog's tail, to the woodsy tang of cool, wet moss and the soft rustle of wind through the topmost branches of leafy trees, NATURE MAGAZINE will be a monthly treat.

You will find in NATURE MAGAZINE a publication perfectly attuned to YOUR nature, feeling the things that you feel and expressing your thoughts. You will find instruction through the medium of entertainment. You will agree that here is not "just another periodical," but a publication with a real purpose.

You are urged to send your name and address at once, with $2.00 for membership in American Nature Association, including NATURE MAGAZINE.

Subscription price to non-members is $2.50 a year.

AMERICAN NATURE ASSOCIATION,
1214 Sixteenth St. N.W.,
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I desire membership in the American Nature Association, including NATURE MAGAZINE each month, and such bulletins and information as are given to members. I will remit $2.00 for one year's dues upon receipt of your bill.

90% of the annual dues is designated for subscription to the magazine

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July

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July

Nature Calendar

JULY

> "The air is pearly, iridescent, pure;
> These profound and radiant noons mature,
> Unfolding even as odorous roses of clear light;
> Familiar roads to distances invite
> Like slow and graceful gestures, one by one
> Bound for the pearly-hued horizon and the sun."
> —*Emile Verhaeren.*

Who would not heed the call of the "open road" from the glaring heat and din of the city to the cool and shady recesses of the wood where await the treasures and wonders of Nature?

In ancient times Yarrow was held in much higher repute than it is today. Mention of it as a valuable medicinal plant may be found in the literature, folk-lore, and mythology of many peoples.

Luxuriantly spreading Ferns and soft green Mosses make the forest a tempting retreat.

Wild Honeysuckle blossoms are attracting scores of bees.

Tiger and Turk's Cap Lilies are at the height of their season.

Holding their delicate white flowers high, Arrowheads wade the margins of the ponds.

Out toward the center, Water Lilies open their beautiful white petals to the morning sun.

Is it any wonder that the brilliant orange flower clusters of Butterfly-weed are favored by many insect guests?

Butter-and-eggs, flourishing where few flowers could exist, is indeed "rapidly inheriting the earth."

Stately Hollyhocks overtop the myriads of bright colored flowers in the garden.

Like a bit of molten gold is the little beetle, *Cassida aurichalcea,* clinging to the leaves of the Morning-glory.

The Muskrat may be raising a second brood of young now.

Bats begin to circle overhead, performing aerial maneuvers more remarkable than those of any aeroplane.

Tadpoles of the Spring Peeper are rapidly losing their appendages of youth. They may be found among the leaves and mosses at the brink of the pond diligently hunting mosquitoes, gnats and ants.

When the heat of midday silences nearly every other bird note the Indigo Bunting cheers us with a jubilant burst of song.

At night Daddy-longlegs, too, come forth from their retreats and hunt for food.

Examine the exquisite workmanship displayed in the orb-web of the large black and yellow Garden Spider.

The Monarch is hanging her jewel-like jade chrysalid.

Garter Snakelings begin early to shift for themselves, catching small toads, earthworms and insects.

About this time the Spotted Adder or Milk Snake is laying her eggs. There are from seven to twenty eggs in one nest.

At dusk the Sphinx Moth visits the delicate pink flower clusters of Bouncing Bet for a last sip of nectar.

As early as this month certain birds begin to flock, forming the nuclei of the larger gatherings which occur later.

Bobolinks, Tree Swallows, Red-wings and Grackles form small bird bands.

The House Wren, too, is a tireless little songster these days.

As twilight deepens Fireflies flash among the bushes.

Now and then a sweet bird melody is borne on the soft night air.

Prepared for NATURE MAGAZINE by the Cleveland Museum of Natural History

THE BOTTLE BABY

Perfectly content with this method of feeding, the baby cougar holds as firmly to his bottle as a human baby.

THREE MONTHS OLD

This cougar kitten is tousled from playing and his whiskers are actually worn off from rolling and biting.

NATURE MAGAZINE

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A largeness takes possession of a man who lives and loves the out-of-doors.—ROLAND I. SAWYER.

Baby Panthers for Playmates

By WILLIAM L. AND IRENE FINLEY

Of the National Association of Audubon Societies

(PHOTOS BY THE AUTHORS)

"I WONDER what's in that box?" asked William.

"Dinged if I know! In my day I've handled lots of funny boxes," answered the expressman, as he passed out a book to be signed, "Received in Good Order."

On the corner of the box, at the top, it said, "Water Here." The box was silent—very silent. In fact, there was something uncanny about the stillness.

"It must be a new pet of some kind," said Phoebe Katherine. She stepped back as she saw a big woolly paw extend silently up through the water hole and sharp-hooked claws open in an emphatic appeal for freedom.

Father pried off the top boards, and out climbed three cats. Each was the size of an ordinary tabby, but they were yellowish-brown with a pattern of darker spots. Their paws were the size of small boxing gloves. Their chins were white with little black mustaches and long whiskers.

"We've never seen such queer cats. Can we pet them?" asked the children, eager to make friends.

"These are panther kittens, often called cougars, pumas or mountain lions," answered father. "They have come to live with you for two months. Then they are going back to their mountain home."

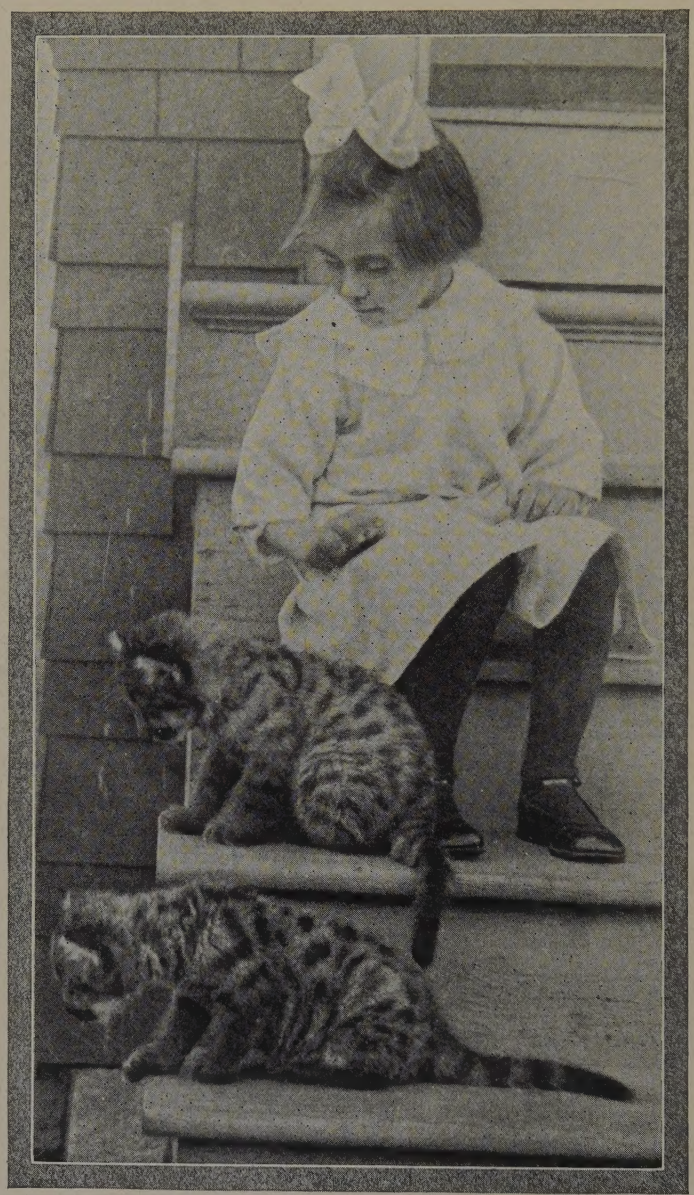
As the kittens sniffed around their new playmates, the children fell to petting them. They had never read stories of how panthers killed men and ate children. We had, and that was why we were interested. Not that we cared to

THEIR TEETH AND CLAWS ARE SHARP

But the baby panthers can be taught not to strike or bite too hard, something it is difficult to teach a bear cub.

have our children served on the cougar bill-of-fare, but we were skeptical about the stories. Our experience with wild animals had led us to believe that even the wildest, if taken from their homes when very young, would readily adapt themselves and would be gentle and reliable if treated with kindness.

"What's that!" exclaimed the children early the next morning. It was a high-pitched, screechy whistle that none of us had ever heard before. The cougar orphans were calling for their breakfast. It was a sound that had no resemblance to that of an ordinary cat. Later we watched a baby cougar as he opened his mouth and we expected a meow. But it sounded as if he had lost his voice through hoarseness. There seemed to be an effort to express an ordinary cat call, but the throat contracted in some way, and at the end of the wheezy attempt came this shrill, penetrating noise. It was a call almost ventriloquistic at times, used for the purpose of reaching away into the distance. We have noticed that bobcats have the same difficulty in giving a note of friendly greeting, which would lead us to believe that the expressive meow of a house cat, when asking for food, is an acquired call through long association with man. The cry of the cougar in the wild has often been described as the wail of a frightened woman or a child screaming in pain from the depths of the forest.



LITTLE PANTHER PLAYMATES

While young the cougars are gentle and reliable and make, as do domestic kittens, good playmates for the children.

It was an exciting and interesting time when the first cougar meal was served. We got a bottle of milk and a nipple, but this has no resemblance to, or any association with, the warm milk of the mother's breast. Hunger and the sense of smell, however, soon led one of the baby cougars to believe that there was nourishment somewhere in connection with our hands and the bottle. By opening his mouth and slipping in the nipple, he got a taste of milk, and the trick was done; for he began to suck. Then the others pushed and squirmed to try this new trick. In a short time, they all caught on to this way of getting dinner.

The kittens never did seem to understand the mechanism of a bottle and a nipple, although they did recognize this source of nourishment through association and a sense of smell. One day we set the bottle of milk on the ground. All three began to nose and paw it over. Finally one got hold of the nipple. He sat back and pulled. It came loose and the milk poured out on the ground. The one with the nipple was sure the milk would come if he sucked long enough. He sat up and pawed the air and would not let go. The others kept rolling the empty bottle over and over, paying no attention to the milk on the ground, for they were sure the bottle was a source of supply.

The baby cougars have a way of kneading the mother's breast, pushing, opening and closing their sharp claws. This may not have been uncomfortable on the heavy fur and skin of the mother, but the little orphans made it painful for a bare hand. This difficulty was corrected by serving the meals with leather gloves.

The disposition of the cougar kittens was very different from that of bear cubs. The kittens rolled and pushed to take their turns out of the same bottle of milk, and later all lapped quietly out of the same pan. But we found that one bottle or one pan was never big enough for two cubs. If one cub was getting his dinner and another came up, there was a flash of

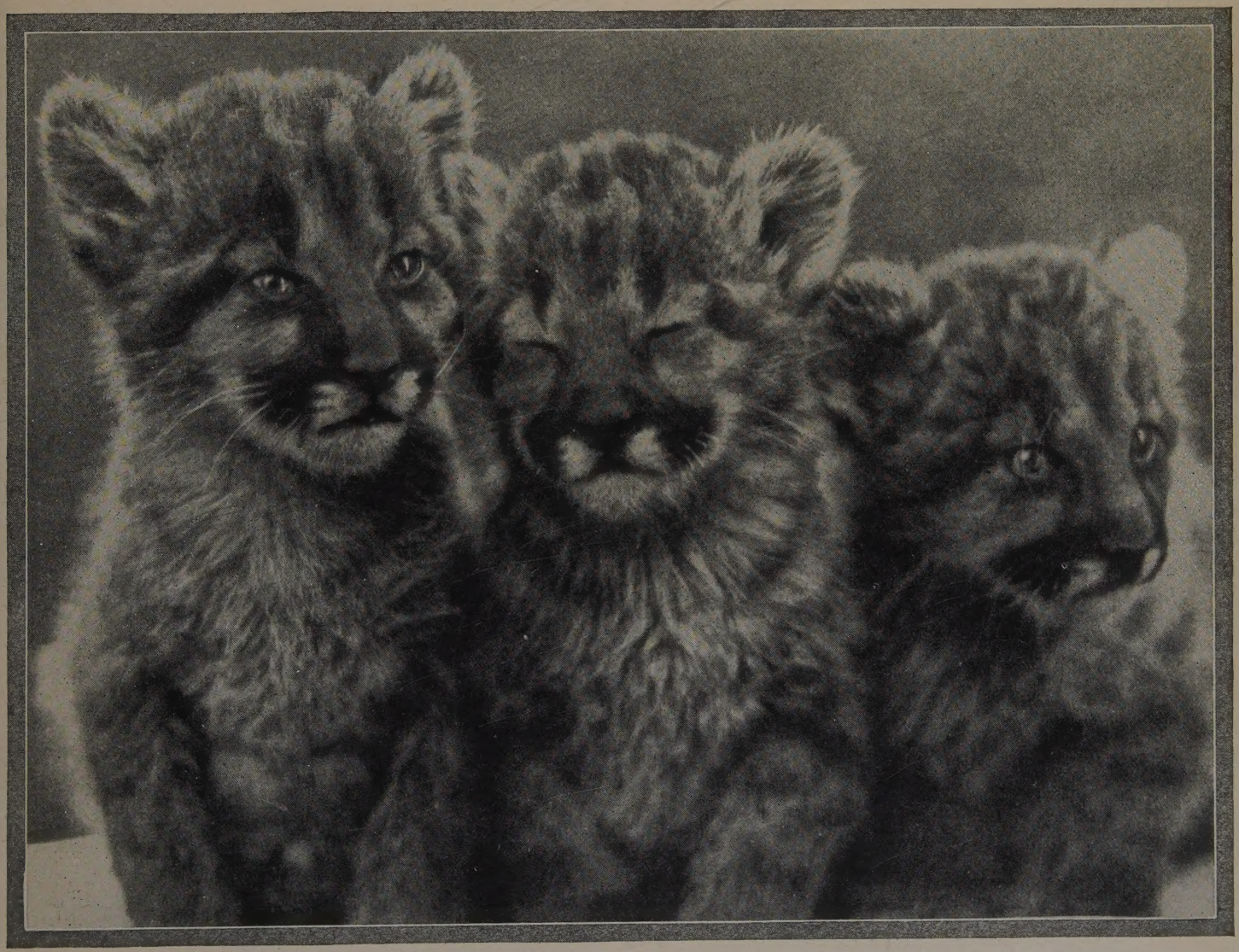
anger and a rough and tumble fight. A bear cub would rather fight than share his dinner with anyone else.

During their two months' stay, it was never dangerous for the children to play and tousle the lion kittens with their bare hands. There was never a show of anger. They purred loudly when petted. Their teeth and claws were sharp. If they came down a little too hard on a hand, a light box on the ear made them quit. In this respect, a cougar kitten is very different from a bear cub. A cub has a touchy disposition. If he plays too rough and you slap him, he comes back quickly. His idea is that of the proverbial Irishman. If there is any fighting, he wants to do the most of it.

These cougar or mountain lion kittens were the offspring of the biggest cat in America. This animal was never really abundant, but was found in all the wilder sections of America from Canada to Patagonia. It has never been a danger to man like the lions of Africa and India. From the earliest association with man, the cougar wisely learned that man carried the deadliest weapons, and that the safest course was to avoid him in every possible way. Many stories have been written of cougars catching people. Very few are authentic. It is always safe, however, to remember that this is such a big and powerful cat that it could kill an unarmed person if it were so inclined. How surprising that these playmates of the children adapted themselves so easily to new conditions. How readily they overcame the natural traits of their long line of ancestors.

As we played with these young cougars day after day, the more we thought of the volumes of natural history that could be written on the intimate lives of all the wild creatures about us. How little we know of their real intelligence. In some ways, they

(CONTINUED ON PAGE 63)



KITTENS OF THE BIG AND WILD AMERICAN COUGAR

When they are young they play, purr and like to be petted just like any tame baby cats, but they cannot meow to express their friendliness, making a shrill penetrating noise instead.

Some of the delegates who came from all parts of the country to attend the Out-of-Door Conference called

The First National Conference on Out-of-Door

FEW GATHERINGS of citizens have had greater fundamental significance than that which met in Washington from May 22 to 24 in answer to the President's call for a Conference on Outdoor Recreation. Naturalists and park executives; civic workers and sportsmen; athletic leaders and conservationists; foresters and landscape architects, and many others whose activity and interest leads them to the out-of-doors, met and exchanged views.

President Coolidge called the conference to consider the question of putting "the chance for out-of-door pleasure within the grasp of the rank and file of our people." It was his thought to bring about coordination in the great movement of the American people into the outdoors. It was his aim to create a means so to shape this movement that the maximum benefits of health and good citizenship may be derived from it.

> *"I WANT to see all Americans have a reasonable amount of leisure . . . Theirs is a land of varied climes and scenery, of mountain and plain, of lake and stream. It is the American heritage. We must make it a land of vision, a land of work, of sincere striving for the good, but we must add to all these, in order to round out the full stature of the people, an ample effort to make it a land of wholesome enjoyment and perennial gladness."*—CALVIN COOLIDGE

At the opening session of the conference, which filled the auditorium of the National Museum on the morning of May 22, the President sounded this keynote. He expressed the hope that the meeting would lead "to contribute to the health, to broader appreciation of Nature and her works, to a truer insight into the whole affair of existence." He declared that the means and resources which we have should serve to acquaint the people "with the wonders and delights of this world in which we live, and of this country of which we are the joint inheritors."

"Through them," President Coolidge said, "we may teach our children true sportsmanship, right living and love of being square, the sincere purpose to make our lives genuinely useful and helpful to our fellows. All of these may be implanted through a wise use of recreational opportunities."

To Theodore Roosevelt, Assistant Secretary of the Navy, was turned over the executive chairmanship of the conference. He elaborated the general aims of the meeting, emphasizing that there is no desire to federalize recreation but to bring together those now working in that field. Seventeen committees were appointed to consider questions within the scope of the conference, and, while there were many interesting and able addresses delivered at the sessions, it was in the deliberations of these committees and their reports that the permanent and far-reaching work of the conference was accomplished.

At the closing session of the conference the Resolutions Committee brought in a report, which

by President Coolidge, and held in Washington, D. C., at which two hundred organizations were represented.

Recreation Emphasizes the Delights of Nature

was adopted by the conference and outlined in a broad way its general sentiment for the present and the future. Provision was made and approved by the conference for the creation of a permanent organization governed by a commission to be appointed by the President and a large and representative general council.

The conference adopted a general resolution which defines broadly its objects when it subscribed to the statement "that outdoor recreation furnishes opportunity to gain abounding health, strength, wholesome enjoyment, understanding and love of Nature, good fellowship and keen sportsmanship and, above all, has a direct beneficial influence on the formation of sturdy character by developing those qualities of self-control, endurance under hardship, reliance on self, and cooperation with others in team work, which are so necessary to good citizenship."

> *"THAT the conference endorse Nature Study in Schools and the extension of the Nature Study idea to every American school and family; that provision be made in the curricula of all normal schools and colleges for the training of the necessary teachers and leaders in Nature Study; that the establishment of museums of natural history in National Parks will increase the education and recreational value of the Parks."*—Resolution of the Conference.

The members of the American Nature Association were privileged to be represented on four of the important committees of the conference through their officers. The members of the association will be pleased to know that the whole conference and several of its committees went emphatically on record in support of the very aims of their association.

One of the outstanding features of the conference was the emphasis placed upon the importance of nature study and knowledge in carrying through the outdoor program. This is a basic principle of the American Nature Association. It was embodied in the following resolution adopted by the conference:

"That we recognize that the education of school children and popular education through the press and other publications, and through churches, colleges, and in other ways, offer the surest means of protecting wild plants and flowers; and we heartily commend the work of volunteer organizations which have already exerted much influence and proved the effectiveness of popular education.

"That every city and town should possess, as a part of the nature study equipment of the public schools, and for public recreation, a wild park in which the native vegetation is absolutely protected."

The conference approved support of laws for the protection of plants endangered by indiscriminate picking. It urged the need of a National Arboretum and Botanical Park which would provide protection for native plants and contribute to the knowledge of their care and use for public education and recreation.

The Committee on Educational Program declared in its report that "appreciation and love of the outdoors should begin, as with every other form of education, in the public and private schools of the land." The committee urged the "study and extension of the nature study idea for every American school and for every American family." It endorsed nature study courses offered by many public libraries, museums and camps and recommended that all institutions of this character follow the excellent examples already set. The committee "urged that modern and up-to-date books and magazines on natural history subjects be used, as the advance of science has demonstrated the error of many previous so-called authorities."

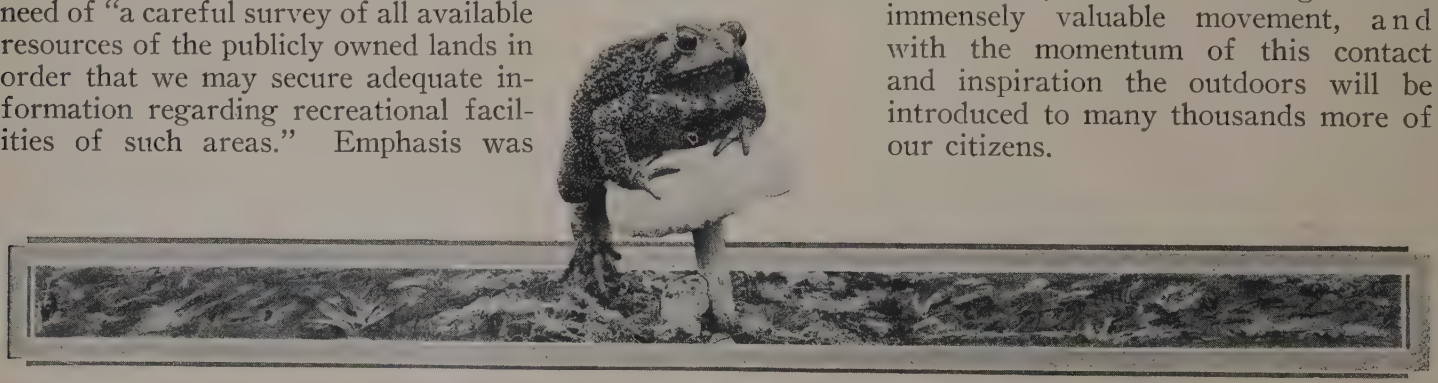
Taking a similar view, the Committee on Plants and Flowers declared: "To inculcate by the example and influence of all good citizens a healthy public sentiment for the wild life of our country, we urge that nature study be incorporated in public grade school work throughout the United States."

The conference endorsed the work of the National Park Service and Forest Service, urging that adjustments of law be made to permit greater recreational use of the National Forests. It called attention to the need of "a careful survey of all available resources of the publicly owned lands in order that we may secure adequate information regarding recreational facilities of such areas." Emphasis was placed upon the need of acquisition by all political units of land and water areas suitable for recreation and the preservation of wild life, and for the conservation of our national resources.

For the protection of birds, the resolution adopted urged greater public education. It asked the cooperation of all sportsmen in research and conservation. Public education and careful investigation were asked to regulate polution and drainage of streams. The federal authorities were requested to enter into negotiations with nations constituting the Pan-American Association to formulate conventions for the protection of migratory wild fowl. Extension of playground work was emphasized.

Col. Theodore Roosevelt, chairman of the Out-of-Door Conference, and Mr. Charles Lathrop Pack, president of the American Nature Association.

These were the official acts of the conference. Far beyond these reach the effects of turning the public attention to the assets available for the enjoyment of the out-of-doors. The conference will serve to create a sense of appreciation of the great National Parks and Forests; the rapidly growing state parks; the municipal parks and playgrounds; the forest trails; the roadside motor camps and the thousands of camps for old and young that are dotting the lakes and seashores. The conference brought together many who are leading in this immensely valuable movement, and with the momentum of this contact and inspiration the outdoors will be introduced to many thousands more of our citizens.



Successful Dogwood Protection Campaign

By P. L. RICKER

Secretary, Washington, D. C., Wild Flower Preservation Society

PEOPLE engaged in wild flower preservation work and those who are not wonder if such work is of value and affects the general public. The spring campaign of the Garden Club of America cooperating with the Washington, D. C., Wild Flower Society was, however, such a conspicuous success that it is worth while to give a brief report of the campaign. Beginning two weeks before dogwood opened, several pictures showing dogwood trees in flower, a close-up view of the flowers and views of people stripping off the branches and carrying them away in an automobile appeared in the Sunday rotogravure section of two local papers with the caption, "Please leave the dogwood for others to enjoy." The following Sunday a half column appeal for dogwood protection was published. As soon as the flowers began opening, 14 by 21 inch posters appeared on the front of most of the street cars showing a girl with an armful of dogwood, with two stripped trees in the background and the words, "Please leave the dogwood for others to enjoy" in two-inch block letters. These were carried by the cars for a week. The posters were placed in all schools and most government buildings, including the Center Market.

Smaller posters were put up throughout the city and along many country roads by Boy and Girl Scouts, and small slips with a general appeal and calling attention to the law were generally distributed. A writer was assigned by the *Evening Star* whose special duty was to get material for a dogwood protection story every day for two weeks. Interviews with leading florists, business men and others commending the campaign were published, as well as several editorials and special articles. A moving picture theater-owner had an operator take an especially planned dogwood film showing the beauty of the roadside, a close-up view of the flowers, their destruction, and the posters with appropriate legends interspersed, and the film was run in the theaters. Copies of the film and posters can be supplied other chapters of organizations wishing to put on a similar campaign, by the Wild Flower Preservation Society.

Favorable comment on the campaign and its conspicuous results were numerous and visitors to the city carried sample posters and other literature to many parts of the country with promise of similar efforts another spring.

It is believed that a very effective campaign on dogwood or any of our other attractive flowers needing protection can be conducted in any locality by similar methods and at small expense, and it is hoped that another spring such educational campaigns will be general throughout the country.

Spare the Dogwood

NONE of our native plants are subject to such ruthless destruction as the Dogwood, mostly by well-meaning people who do not realize that our country roads will soon lose their chief spring attraction. The flowers wilt rapidly and are thrown away. Motorists and others, please help to keep our country roads beautiful.

ABOVE Breaking the branches of the Dogwood trees.

BELOW A marauding automobile party following an attack upon the Dogwoods.

Insect Burglars Steal from Flowers

By CLARENCE M. WEED

State Normal School, Lowell, Mass.

IN THE world of men in which we live a burglar is one who breaks into a building for the purpose of stealing. Unless alarmed before he leaves, the burglar usually takes away something of value without giving anything in exchange. Such a person commits a burglary and if caught is liable to be sent to prison.

There are burglaries also in the world of flowers and insects. Fortunately they are not very common but they happen often enough to be readily found if one searches for them.

If you live in a region where the beautiful red columbine hangs out its charming blossoms, you can probably see such a burglary, and watch the burglar in the act. This flower is naturally adapted to having its pollen carried from plant to plant by hummingbirds and long-tongued bumblebees. When it first opens, the slender, thread-like stigmas project below the mouth of the flower. A little later the pollen-bearing stamens hang down beside them. The sweet nectar is held inside the five long spurs that point upward as the flower hangs downward.

Some bumblebees with long tongues are very fond of this columbine nectar. They visit the blossoms day after day in order to get it. One will alight upon the cluster of pollen-bearing stamens and thrust its tongue rapidly into the nectar spurs. When it leaves it carries many pollen-grains upon its body and legs. If next it goes to a flower just opening, it alights upon the cluster of stigmas and so brings to them many of the pollen-grains from the other flower. It thus brings about cross-pollination.

This bumblebee is a lawful visitor. It enters the open door and gets the nectar, but in exchange it carries the pollen from flower to flower and so renders a service of great value to the plant, upon which the latter is dependent.

There are some bumblebees, however, whose tongues are not long enough to reach the nectar hidden in the spurs when the bee alights at the mouth of the flower. So these bees have become burglars. They alight upon the top of the flower where the nectar-spurs are, rather than the bottom where the pollen is. Next they break into the nectar-spurs by biting holes with their jaws. Then they suck the nectar and fly away, leaving the spurs, which before were so prettily erect, to droop over in a helpless fashion.

Thus these burglar-bees have not only taken the nectar away without doing any

THREE SPRING FLOWERS

They are columbine, squirrel corn and Dutchman's breeches, or Dicentra, all of which are subject to visits from insect burglars.

(CONTINUED ON PAGE 55)

"Twenty-five Hundred Dollars Reward"

By E. R. KALMBACH

Assistant Biologist, U. S. Biological Survey

"SWAT the crow!" The call to arms has been heard on every side. From Maine to California and from northern Canada to the Gulf the message has been spread. The daily press, sportsmen's periodicals, the lecture platform, and the advertising column have been drawn upon to carry zealous appeals urging nation-wide destruction of a bird. The death sentence had been proclaimed. There were to be no mitigating circumstances and no reprieves. The case of the crow had left the jury and was placed in the hands of the executioners. The sentence was to be carried out as speedily as modern firearms and an ever-increasing army of gunners could accomplish the task.

One is led to believe from the storm of criticism of the crow that has swept the country that either startling new facts have come to light regarding the bird, or the crow itself has undergone a decided change for the worse in its habits.

Sportsmen, quite generally, are supporting the contention that mankind would be better off without the crow; while farmers seem somewhat divided in opinion. In the rank and file of that great mass of people, however, who have a real and constructive interest in all that helps to make up the great out-of-doors, honest inquiries have been made as to what this is all about.

PHOTO BY L. W. BROWNELL

IS THE CROW CONDEMNED?

Prizes have been offered for the destruction of this well-known bird.

They have asked significantly whether the opinions so widely published are the result of careful, unbiased, and thorough study by competent investigators. These inquiries certainly are reasonable, and it is in the interest of a policy of constructive game conservation and sound agricultural economy that they be answered and the problem of the crow presented in a thoroughly impartial manner.

While it would be impossible to present in a short article all the facts, there are three important assertions that have appeared in print so frequently that comment on them seems desirable. We have been told (1) that the crow has few or no redeeming qualities; (2) that it is an outstanding menace to other bird life, especially game; and (3) that it is universally destructive to crops.

Birds are chiefly valuable to us because they kill insects. The crow is no exception to this rule. About a fifth of the adult crow's annual food is taken from the insect world, its share of insects being made up largely of species found on or near the ground. From April to August, inclusive, insects are over a third of the adult crow's diet and include such notorious pests as May beetles (the adult form of the white grub), wireworms, cutworms, and grasshoppers. Nestling crows, outdoing their parents in insect consumption during the spring months, get nearly half of their sustenance from these insects.

Stomach examination of crows has given not only an accurate knowledge of the character of the bird's insect food but it has also given us an idea of the quantity the bird eats. Imagine a bird consuming 85 May beetles, 72 wireworms, or 123 grasshoppers within an hour or two.

Even the rankest of anti-crow partisans must admit that a bird doing this has actual powers for great good. When broods of four young may be found that have eaten over 400 grasshoppers, and other broods of seven, a total of more than 580, during a few hours, the beneficial influence of a crow family becomes evident. One particularly greedy individual had taken 143, the largest number of grasshoppers credited to the appetite of any one crow, young or old.

That crows do not always expect the farmer to provide their food is well illustrated by material collected in Kansas in 1913. Of a total of 157 nestling crows taken at random in an area infested with grasshoppers, 151 were found to have fed on the insects. From the grain fields of Manitoba have

come twelve crows that had consumed grasshoppers at the rate of 57 apiece.

And thus one might continue to cite noteworthy records of insect destruction resulting from the critical examination of over 2,100 stomachs of crows collected in 40 of our states, the District of Columbia, and several Canadian provinces, a thoroughly representative lot of material that might well be considered to reflect *average* conditions throughout the crow's range. These and many other similar facts greatly discount the statement that has been so widely published that "crows have few or no redeeming qualities." Regardless of certain shortcomings in other directions, to which due consideration will be given, the crow must be credited with possessing a potent influence for good through its insect destruction, and while engaged in such pursuits it is entitled to at least a temporary respite.

The cannibalistic habits of the crow, in the opinion of sportsmen generally, constitute the unpardonable sin. The destruction of the crow, it is claimed, will do more than any other single effort toward assuring a degree of safety for small insect-eating birds that they have previously never enjoyed in the crow's company.

PHOTO BY H. T. MIDDLETON

HOW MUCH CORN DOES A CROW EAT?

Some farmers think it destructive; others appreciate its value because it destroys harmful insects.

Instances of the crow's vandalism are of frequent record, and sometimes constitute a distinct handicap to successful reproduction in the case of birds that nest in colonies. Typical of such reports are those that come almost annually from certain bird reservations where large colonies of grebes, ducks, rails, herons, terns, and other more or less defenseless species are deprived of one or more settings of eggs before a successful hatch is brought forth. Similar depredations have been noted on the nests of such game birds as prairie chickens, sharp-tailed grouse, and quail, while the destruction of the eggs or young of insect-eating birds is a matter of record coming from a variety of localities. Much of the evidence presented is alarming, and its sources are above reproach.

There is no question that on game farms and on preserves or sanctuaries, where it is the desire to maintain certain forms of bird life in numbers often greater than that normally decreed by nature, control of the crow is not only justifiable but even necessary. There may even be areas of greater size where wild bird life is placed at a disadvantage through a local or temporary overabundance of crows, and a thinning-out process would be of benefit. To proclaim, however, that the crow is universally and continually so great a menace to game and other bird life that its destruction is justified on all occasions is a statement not warranted by the facts.

Let us consider for a moment the crow as a nest despoiler under *average* conditions, as brought out by the examination of the 2,100 stomachs previously referred to. About a third of 1 per cent of the annual food of adult crows and 1½ per cent of that of the nestlings is derived from wild birds or their eggs. About 1 in every 28 adult crows and 1 in every 11 nestlings examined had eaten such food. In the case of nestlings, however, this ratio no doubt presents an exaggerated idea of the work actually done, as in many instances several members of a brood had fed on parts of the same victim, and in this manner several records may represent only one act of vandalism. In the case of egg destruction, an important mitigating factor presents itself which accounts for the many instances of persecuted colonies surviving indefinitely in spite of crow aggressions. Crow vandalism is at its worst during the crow's own nesting season, a time early enough in the year to permit the laying of a second or even third clutch of eggs, to be incubated at a time when crows are less persistent.

With such an index available regarding the vandalism of the crow under what may be justly considered *average* conditions, this activity of the species may be accorded its proper significance. While it is evident that a concentration of crows in the

vicinity of game farms, preserves, and sanctuaries may call for control measures, under general field conditions the drain is no more than can be readily replenished, provided the species affected are given reasonable protection at the hands of man himself.

It wasn't the crow that started the passenger pigeon on its downward course; the prairie chicken always held its own where it had only predatory birds and mammals to combat; and even the passing heath hen on Marthas Vineyard, protected from all vermin in its later days as far as it was humanly possible, has played a losing game since man, the killer, depleted its ranks to a point where its racial virility became completely sapped. One need only

PHOTO BY H. T. MIDDLETON

WHY KILL IT UNJUSTLY?

The crow does some damage to crops and to birds but it also does a great deal of good.

witness the tremendous stimulus given to some forms of small bird life since the passage of the Migratory Bird Treaty Act to realize that man himself is the dominating factor controlling the destinies of many of our wild birds.

In spite of crows, and the depredations of all other vermin, some of our smaller birds have increased in recent years to the point where actual control measures have been called for, and from the constantly increasing hordes of wild fowl that every fall come out of the northern states and Canada it is manifest that even those helpless species can readily compete with their natural enemies under *average* field conditions if they are given a sporting chance at the hands of man.

Aside from other very serious objections to such a procedure, mentioned subsequently, I do not be-

PHOTO BY H. T. MIDDLETON

TO BE OR NOT TO BE?

Is a campaign for the absolute destruction of the crow warranted by the facts?

lieve that the bird life of this country has been so severely depleted by natural enemies that a universal and indiscriminate campaign against the crow is called for.

Are the farmers paying too high a price for the insect-destroying services of this bird? Having had opportunity in recent years to be a witness to some of the most remarkable concentrations of crows ever recorded in agricultural sections of the middle west and northwest, and having been called upon to spend considerable time perfecting control measures in localities where damage to crops was excessive, I feel I may venture an answer to the question, "Is not a reduction in the crow population desirable from the standpoint of sound agricultural economy?" My answer is an emphatic "Yes. Yes—in spots."

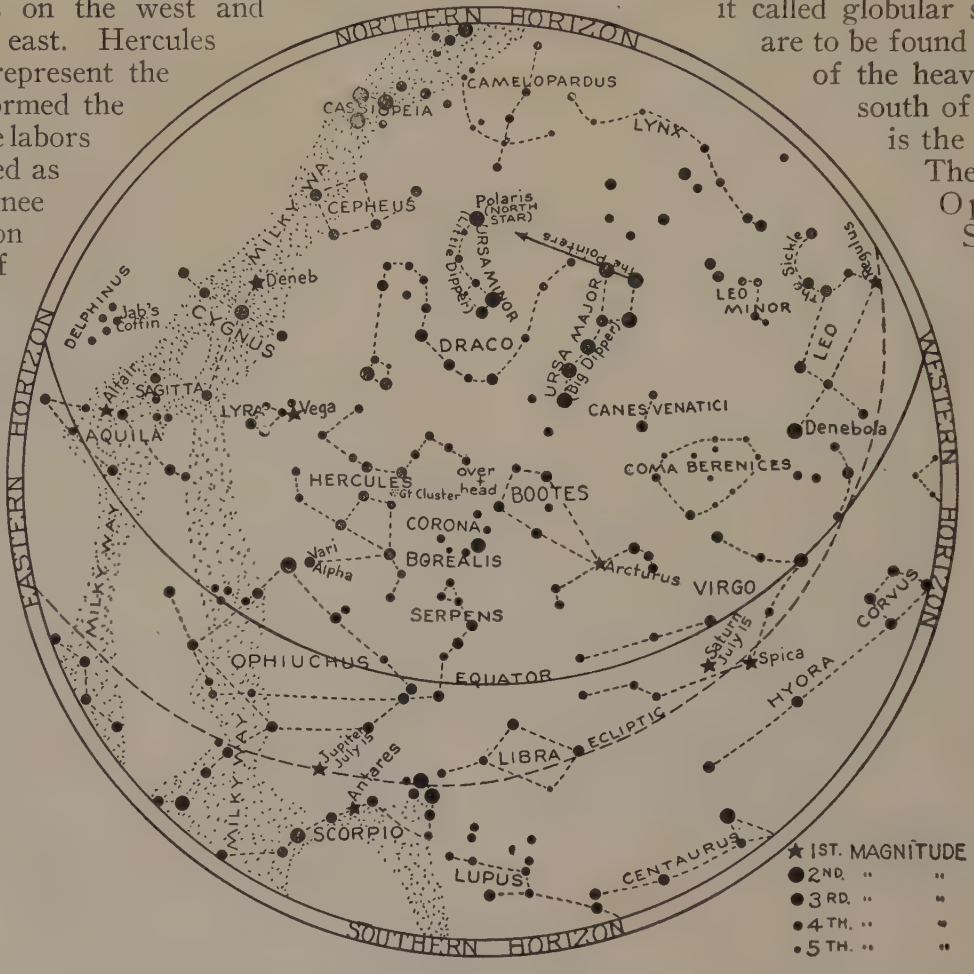
Such a "spot" may be confined to a single barnyard involving the depredations of a single bird; it may cover several farms within foraging distance of a particularly troublesome family of crows; it may even be a township or two supplied with these birds in numbers from some nearby winter roost; and, in a few instances, as in central and northern Oklahoma, southern Kansas, and points

(CONTINUED ON PAGE 60)

The Evening Skies in July

By ISABEL M. LEWIS

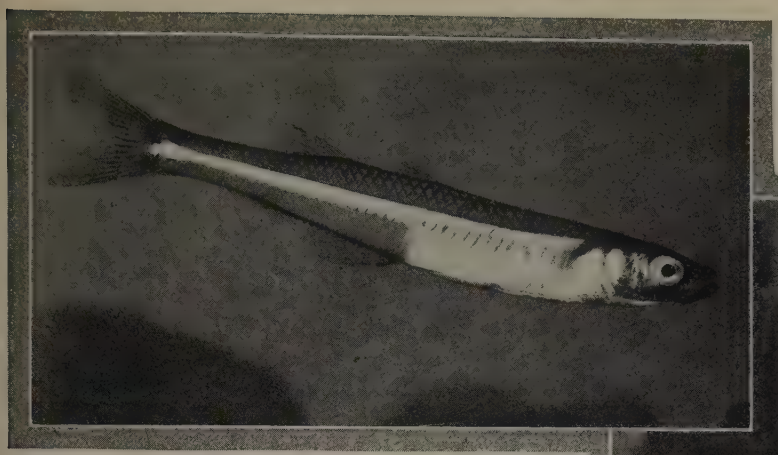
NEARLY overhead during the early evening hours of July may be seen a perfect little semicircle of six stars known as Corona Borealis, The Northern Crown. The brightest of these, the jewel in the crown, is a star of the second magnitude known as Gemma or Alphacca. This little group of stars lies between the huge constellations of Boötes on the west and Hercules on the east. Hercules is supposed to represent the giant who performed the celebrated twelve labors and he is pictured as resting on one knee with his foot on the head of Draco, The Dragon, which is just to the north of Hercules. The head of Hercules marked by the variable star Alpha Herculis is close to that of Ophiuchus, The Serpent-bearer.



The beautiful bluish-white star Vega in the small constellation of Lyra, The Harp, next to Hercules on the east is the brightest star north of the equator though it is only a shade brighter than Arcturus in Boötes which lies next to Corona Borealis on the west. We can always recognize Vega by the two little stars close to it which form a little triangle with Vega. If we draw a line from Vega to Corona we will find, at the point where this line crosses the western side of the four-sided figure that outlines the body of Hercules, a faint hazy patch of light visible without a telescope on clear, dark nights. This is the Great Star Cluster in Hercules. It is a universe of giant suns thirty thousand or more in number closely packed together, or so it seems to us looking at it with a powerful telescope. Yet really the distance between the nearest neighboring stars in this cluster is over a trillion miles. This cluster is so far away that its light takes something like thirty thousand years to travel to the earth at the rate of 186,000 miles a second. Moreover, it is one of the nearer of about one hundred objects similar to it called globular star clusters that are to be found in different parts of the heavens. Just to the south of Corona Borealis is the head of Serpens, The Serpent that Ophiuchus, The Serpent-bearer, holds in his hands. Ophiuchus, so the story goes, was the son of Apollo and a great physician, too great in fact to please Pluto, god of the Lower World, whose kingdom was becoming depopulated as a result of his skill in raising the dead to life. So Pluto urged Jupiter to hurl a thunderbolt at him. Apollo insisted, however, that his son be given a place in the heavens, and there you will find him today, his head, marked by a second-magnitude star, the brightest in the constellation, close to that of the hero Hercules.

Almost due south now we find Scorpio, the Scorpion, his long tail trailing down to the southern horizon and his heart marked by the fiery Antares which is one of the giant stars of the heavens four hundred million miles in diameter and distant from us 350 light years. Antares is called "Rival of Mars" because when Mars is most distant from the earth it very much resembles this star in appear-

(CONTINUED ON PAGE 62)



ABOVE

Menidia notata is one of our small silvery shore fish.

The sand eel loves to bury itself in the drifting sands on the bottom of the sea.

BELOW

Sea-Shore Life and How to Find It

By DR. E. BADE

BY FAR the greater part of the marine animals are found profusely along the coast. Here the conditions for life are most favorable for both the plant and the animal-eating species. Flood tides and ocean currents are continually washing the dead bodies of small and large organisms on the beach, a welcome food supply for the denizen of the shore. This, in part, comes from the rivers, streams, and brooks of the mainland which hurry toward the ocean. The wind also carries many animals, especially birds and insects, far out over the water where they drown. The waves then slowly carry the dead animals back towards the shore. The waters along the beach are much warmer than they are out in the ocean. When the ebb tide has retreated, the hot sun burns down upon the sand, and, when the flood tides begin to roll over the beach again, they find a new source of heat. In the strong light of the shore the plant world develops luxuriantly, offering the marine life adequate protection and many hiding places, and, at the same time, giving the plant eaters an inexhaustible supply of food.

The flood phenomena which take place 26 times in 27 days cause a considerable change of pressure. At times the organic world is barely covered with water, and a few hours later they must withstand a pressure of a column of water a number of feet in height. These influences of the water are accentuated when storms pass over the ocean, stir up the sea, and then hurl mighty waves against the

The lady crab is a beautiful animal found on sandy bottoms.

shore. Such gigantic movements are not without their influence on the marine flora and fauna. The former is extraordinarily tough so that it can

The ribbed mussel has radiating ridges on the shell.

withstand the unruly waters, and then they are so firmly anchored, attaching their roots to heavy stones, that they are torn with great difficulty from their places of development. Plants are seldom found on sandy shores, for they do not find a sufficient hold on the bottom. The animals of the shore are generally more massively built than their relatives of the deep. Some are surrounded with a flexible covering which follows the current and the pressure of the water. The crabs develop a hard calcareous armor which protects them when rolled about by the waves or the undertow. The mussels and the snails of the beach are also characterized by hard thick shells which are often further strengthened through knobs and other projections. Other animals have flattened bodies so that the water cannot whirl them away from their places of attachment. Still other shore animals attach themselves firmly to some foundation; they construct an immovable house upon it. These animals have become accustomed to the continual change of the shore and can live, when the water is at ebb tide, for a short time without water.

Every visitor to the beach notices the barnacles (*Balanus*) which almost reach to the high-water mark. Here they cover the rocks and boulders with dazzling white calcareous shells, cover the posts of shore buildings, and only too often cover the bottoms of salt water ships.

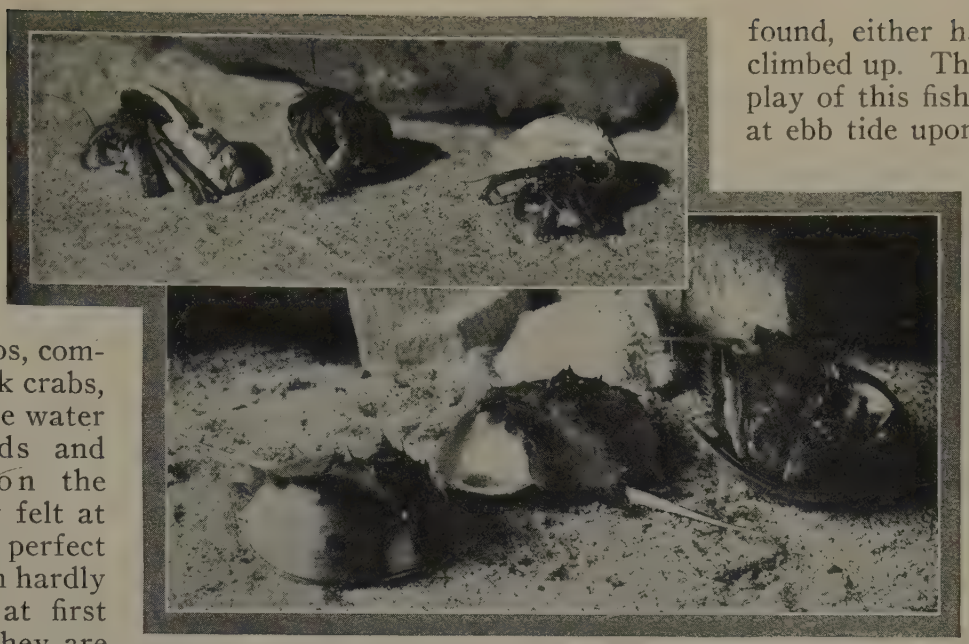
The white-armed anemone is very common in Long Island Sound.

The skate is one of the fish found not far from the sandy shores.

The barnacles are crustaceans which have entirely lost the characteristics of their relatives. In their earliest youth they are very tiny, free swimming, pear-shaped individuals having three pairs of split swimming legs. After they have moulted a few times the young attach themselves with their heads and secrete a calcareous exoskeleton which completely hides and covers the body. The legs are the only part of the body this animal can protrude through an opening and so cause fine particles of food to be swept into its mouth. Then, when the ebb slowly uncovers these animals, they withdraw their legs and close

up their shells. Such animals cannot leave the place upon which they have once grown. They must remain there all their lives.

The shore crabs, commonly called rock crabs, remain out of the water for long periods and move about on the beach as if they felt at home. They are perfect swimmers, which hardly seems possible at first glance. When they are carried by flood waves to the shore, they bury themselves in the wet sand and wait until the tide has turned to take them back in the water.



UPPER

The hermit crab, a dweller of our shores, protects itself by inserting its abdomen into some empty shell which it carries about in all of its wanderings.

LOWER

The horseshoe crab is a peculiar fellow often found in the quiet basins at low tide.

The small and delicate shrimp (*Cragon* and *Palaemon*) cannot live out of the water. If they should be thrown on the beach by some playful wave, the next flood tide will find them dead. But they are often found at ebb tide in small hollows, depressions and other basins of shallow water left by the retreating tides. Here they swim and play among the killifish.

Many fish, such as Gobiidae and the sand eels (*Ammondytes*) are true dwellers of the shore. The mud hopper (*Periopthalmus*), a genus of the first mentioned family, is an inhabitant of the brackish water and is found in and near the mouth of streams and rivers, where the air roots of the mangroves are especially favored. Upon these the fish is often found, either having jumped or climbed up. The carefree, happy play of this fish is best observed at ebb tide upon the mud or the sand near basins left by the receding tide. It lifts itself to a standing position with the aid of its pectoral fins and keeps a sharp watch with its large protruding eyes for all brightly colored flies, its principal food. It creeps upon the insect like a cat until it is about 5 to 8 cm. from it, then, with a sudden jump it hurls itself through the air and catches the fly in its mouth. It can jump from the water, mud, or sand with equal facility, the pectoral, pelvic, and caudal fins aiding its sudden locomotion. The narrow gillcover opening tends to help the fish remain out of the water for a considerable period.

LOWER

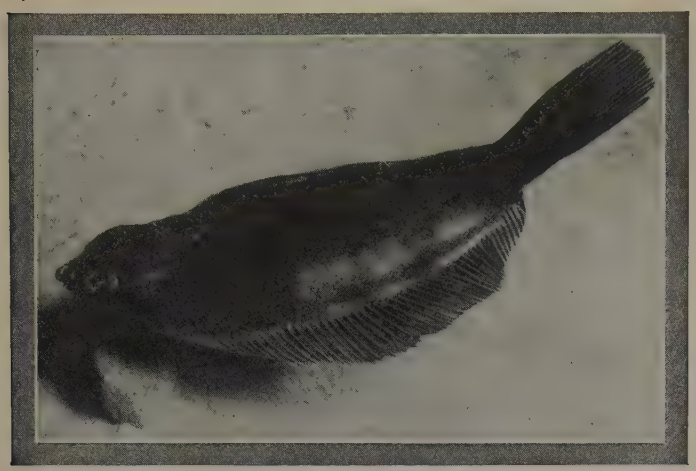
The clam digger begins his work at ebb tide when the waves have retreated, leaving little islands of sand surrounded with shallow basins of water.

The little basins left by the retreating tide are filled with a rich harvest of marine animal life.

The sand eels never leave the water. They inhabit the sandy shores of Europe and North America. They are masters at burying themselves into the drifting sands.

In the sand and the mud of the shores a profuse and manifold fauna has its existence, much greater in number than is commonly supposed. Numerous species of mussels have burrowed themselves into the ground. The soft shell clam (*Mya*) is found both in sandy and in muddy shores. Only

then, when high water covers them, is the siphon extended and protrudes from the soil; this carries the water to and from the gills. Only then,

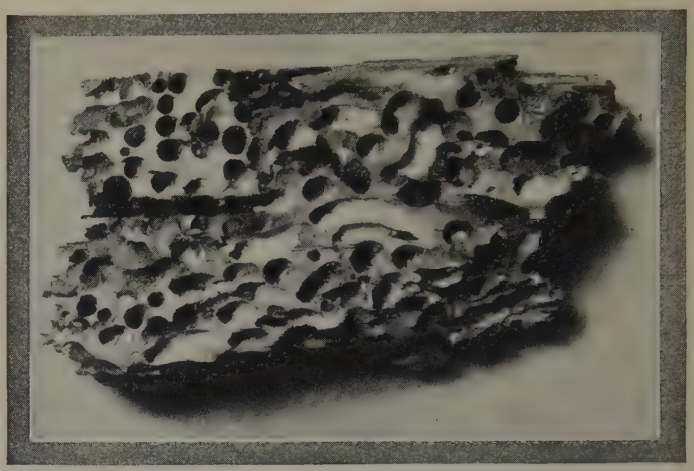


The flounders live on the sandy sea bottom. Here they are difficult to see because they are able to change their color to match the floor of the sea.

when they are rapidly withdrawn into their shell, a small stream of water, like a fountain, is squirted upward. Deep in the sand the razor clam (*Solen*) is found. Its shell is slightly curved with white, reddish or brownish lines. Species of *Matra* with their short siphons also burrow into the ground. They use their long flexible foot for jumping about in the water. These are only a few of the many species found. The little valued edible blue mussel (*Mytilus*), which plays an important part in the food of the Europeans, prefers to live just

The rock crab is met on sandy-stony places of the sea.

below the surface of the water where they attach themselves to stones, pillars, and wharfs, covering them with a dense growth. Their long, tongue-shaped foot has a small gland, called the byssus gland. It secretes a gelatinous mass, which, when it comes in contact with water, hardens into threads. With these it spins itself fast to its support. The young animals of the oyster (*Ostera virginica*) swarm for a short time, and then they attach themselves permanently to rocks, etc. Their lower shell grows fast to the foundation upon which they rest and becomes harder and thicker as time goes by, but the upper shell remains flat and thin. Water enters the oyster



Teredo navalis is a mollusk which bores holes in submerged timbers and does great damage to all kinds of woodwork.

from all sides, and it streams off from all sides. For this reason the oyster is only found on hard and comparatively solid bottoms, where the water flows steadily over them and brings them the necessary food, which consists of microscopic organisms.

The enemy of the oyster is the sea star, which is always found abundantly in and about oyster banks. With the aid of its tiny, cup-shaped sucking feet and its flexible arms the starfish encircles the oyster, clam or mussel, and presses its toothless mouth upon the joints of the closed shell. The trapped animal closes its shell as firmly and as tightly as possible, or it retreats as far into it

The spider crab is often thrown upon the shore by the waves.

as it can. But its strength is soon exhausted as, in all probability, a poisonous excretion either kills or dazes it. On the other hand, it is also said that the uninterrupted constant pressure which the starfish exerts tires the muscles which then open the shell. When the mollusk is open, the starfish protrudes its baggy stomach and enters it into the shell, digesting the animal outside of its body. Tiny animals are taken within the stomach and the skeleton excreted after digestion has taken place.

The soft shell clam is found near and below the low water mark. When covered with water the siphon protrudes far above the sand.

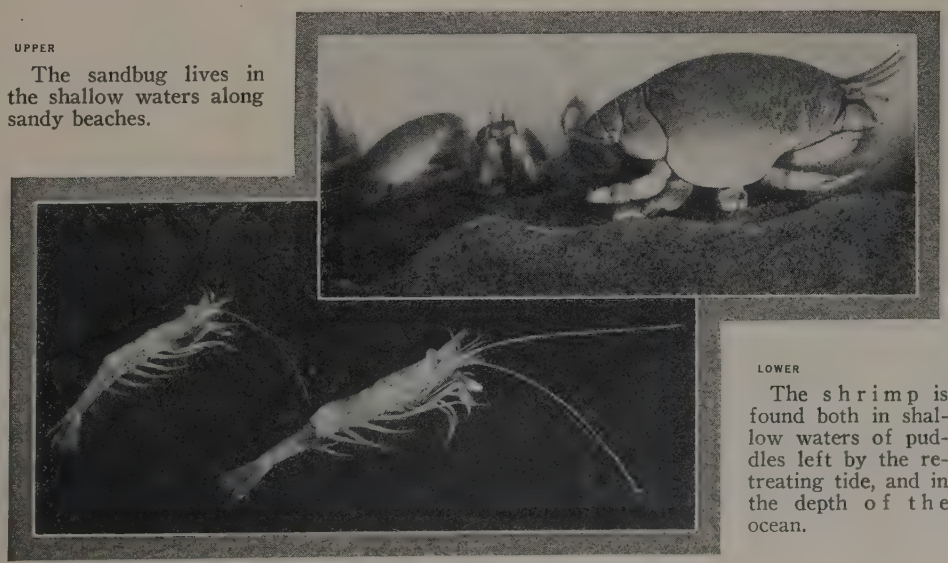
Food is never lacking. It is found in plenty for the starfish and its allies. Here the large sand collar snails (*Lunatia*) are found as well as the whelks (*Sycotypus* and *Fulgur*). He who desires to collect snail shells should go to the beach at ebb tide and he will find numerous species in the thick vegetation.

There, where at low tide the clam-digger seeks the prized clams, worms are found. These are beautiful creatures and do not belong to those parasitic and characterless individuals which are commonly designated as "worms." These delicate and many colored animals are equal to the sea anemones in beauty. The sea mouse (*Aphrodite*) has numerous golden, hair-like bristles which shimmer in all colors of the rainbow. *Nereis*, the clam worm, is also beautiful, but the most beautiful of all are the species of *Serpulidae*, the shell worms, which build and live in leathery or calcareous tubes. These usually grow either entirely or partly upon other objects and are but seldom found sitting loosely in the sand.

Those places of the ocean which are covered with these creatures seem to be, when looking down through the crystal clear waters, a floral garden. Upon slender stalks the feathery crowns of the *Spirographis* are gently rocked from side to side by invisible ocean currents, from unsymmetrical white calcareous shells protrude bright red flowers like the gills of *Portulaca*, while on still other places the tubes form an irregular pattern from which many and brightly colored brushes seem to project (Hydroidea)—more closely resembling floral envelopes than children of the animal world.

UPPER
Cyprinodon variegatus is also found in all tide pools.

LOWER
When the sheephead minnow is in his festive costume he is alive with colors.



UPPER
The sandbug lives in the shallow waters along sandy beaches.

LOWER
The shrimp is found both in shallow waters of puddles left by the retreating tide, and in the depth of the ocean.

The starfishes are the worst enemies of both the clam and the oyster.

Still these organisms are true worms whose segmented body is like that of the earthworm and, in addition, having secreted a tube for its protection, and whose gayly colored protuberances are nothing more than gills which resemble the waving crowns of palm trees.

At the first glance the sea anemones are more flower-like than animal-like. These delicate, richly colored organisms with their numerous tentacles have received names derived from flowers; sea anemones, passion-flower anemones, crimson anemones, etc., are names which characterize their outer appearance correctly, for they change the naked rocks of the shore to floral beds. But the life of these animals is in no way flower-like. They are very voracious, catch young fish, worms, crayfish, snails, etc., which are often much larger than themselves. They have peculiar protective ability in their tentacles, which also serve to daze their prey. These are stinging organs, tiny, microscopical, bottle-shaped glands filled with a burning alkaline fluid. When touched, hollow coiled threads suddenly project, dart towards the touching object with their tiny hooks, and press out the fluid of the capsule, which then enters the wound. Such stinging glands are very numerous on each tentacle; in fact, thousands are located in one. Sea anemones which have congregated in groups, and live in colonies and have ex-

The clam worm has a beautiful iridescent play of colors.

Barnacles are always found at low tide on rocks and posts along the shore.

creted a more or less hard skeleton, whose branches have become calcareous, are corals. Every coral branch or colony had its beginning in one individual which happened to attach itself to that particular place and grew up in the shape of a tiny sea anemone. Upon the under surface of the cylindrical body the animal secretes calcareous plates which join it intimately to its support. Then the calcareous plates grow upward radially, and the outer side of the animal is bounded by a skeleton of lime which grows higher and higher, drawing the polyp before it. And thus it happens that at the branches of a coral colony often thousands of animals continue to build upwards, while the lower animals have long since died. In this way these delicate animals work, and mighty reefs and tropical islands are built by their tireless labor.

BARRED OWL

This owl lives in the deep solitude of swamps and is rarely seen. Note the absence of ear tufts.

LONG-EARED OWL

This member of the owl family is much larger than Screecher, and is sometimes found in colonies of a half dozen or more amid the seclusion of coniferous forests.

GREAT-HORNED OWL

"Death-in-the-Dark," as this savage bird is named, is the most destructive to small game of all the owl clan.

The Screech Owls and Their Kindred

By HOWARD TAYLOR MIDDLETON

WHEN the sun, having donned her nightcap of golden cloud, goes to bed 'neath the western horizon, and the violet tints of approaching twilight creep along the orchard aisles, a faint mournful shivering cry sounds "taps" to departing day; then again the strange voice quavers out upon the quiet air, but louder and more sprightly now—a reveille to evening, which is the screech owl's morning.

For a great many years, at dusk and dawn, have we heard that eerie hail from the old orchard, but until last summer we never tried to locate the home of this tremolo trumpeter of birdland.

Setting about the task in a systematic manner, and that meant searching every tree cavity not screened by cobwebs—cobwebs proclaim an empty dwelling—we eventually came to a knotty old apple tree. In a hole five feet from the ground, which is much lower than an owl usually builds its nest, we found the mother brooding her five downy children.

MOTHER OWL AND TWO OF HER BABIES

When the head of mother appeared, the flash was fired. Note how difficult it is to distinguish the owl from the bark of the tree.

So young were these screech owl babies that the entire quintette were not yet strong enough to pose for the nature cameras, so, for the time being, we were forced to be content with three that were furthest advanced along the road to maturity. This unequal development often exists in bird families and is sometimes due to certain of the fledglings being able, at the very outset of their babyhood, to receive more than their just share of food, thus getting a start on their less fortunate nest-mates. Again, it results from

incubation beginning when the first egg is laid, so that the several members of the family hatch at intervals. We considered ourselves exceedingly lucky in finding mother at home, and immediately set about ways and means of including her in at least one portrait.

As the studio was in deep shadow, and the two largest young owls which we selected for our initial attempt were quite active, we realized that the only method capable of supplying us with both ample exposure and sufficient depth of focus, for a fully-timed and perfectly sharp picture, would be flashlight. Therefore, the Long Focus Premo was set up upon its sturdy tripod, and having been focused carefully on the tree trunk, the shutter was set for "time" and the Rapid Rectilinear lens stopped down to "16." Then the two owlets were posed, one above and the other at one side of the cavity. Now how to induce mother owl to show her face at the window became the leading question. Up until the moment, she had been forced to remain indoors through the medium of our focusing cloth draped across the entrance. Would she appear if the cloth were withdrawn? Experimenting along this line, we found her not only most eager to depart but outrageously angry as well. When a corner of the cloth was pulled aside, letting light into the hole, the indignant bird butted furiously against it with her ear-tufted head, and indulged in such a frenzy of beak-snapping as we had never seen or heard the like of before.

THE BANQUET

A comparison of size between the diner and the meal.

GOING DOWN

One more gulp and the mouse will disappear—all but his tail.

ALMOST GONE

This picture substantiates the forecast made in preceding caption.

To get our portrait of this ensemble, we proceeded as follows (you will remember, please, that the two young owls were already in position, and that the camera was focused with shutter set at "time," and lens at "16"): The Eastman Flash Pistol was now held in hand, above and behind the lens, and focusing cloth entirely removed from before the hole. When the head of mother owl appeared, the shutter was opened, flash fired and shutter closed again *immediately*. It is quite easy to procure a flashlight wild-life portrait in subdued daylight, even though the flash gun and camera are not synchronized, as the result shows. This is possible because, when a short-time-exposure is indulged in, the lens can be stopped down considerably and this prevents enough daylight entering the camera during the interval of time the shutter is open, prior to and following the flash, to produce overexposure—or the effect of a daylight picture. It is necessary, however, to make the exposure as brief as possible. I have explained

MADAME SCREECHER GAZING BEHIND HER

This feathered lady can observe the hang of her gown in the rear without aid from a mirror, and is thereby the envy of less fortunate birdland belles.

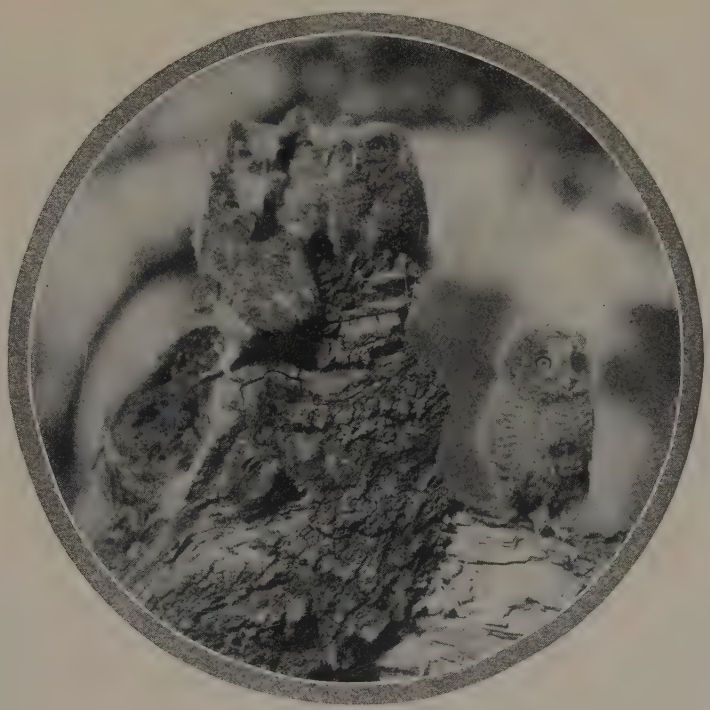
the synchronization of flash gun and camera in my article, "In the Flashlight's Flare," in October, 1923, NATURE MAGAZINE.

For our second portrait we posed three fluffy owl children on a limb against the light to produce that fashionable aureola (crown of glory) effect now much in vogue by the best society portrait studios, and "shot" them with the Graflex. The curiosity of one young poser interfered mightily with the artistry of the camerist, however. One cannot have his portrait done in the best fashion while raptly earth-gazing, can one?

Seven or more times did the sun and moon swing in their gold and silver arcs above the old orchard ere we came again to the abode of the screech owls, and what a change was there awaiting us. Feathers were fast replacing down, and all five of the youngsters were now quite ready for the camera. Taking them, with greatest tenderness, from their nesting hole—mother was not at home today—we assembled them in group formation upon the trunk of a prostrate tree and, watching till the photographic moment came, released the Graflex shutter.

THREE FLUFFY OWL CHILDREN

Posed against the light to show that fashionable aureola effect now in vogue by the best society photographers.



IN GROUP FORMATION

In another week, or less, these little chaps will be sufficiently strong of wing to accompany the parent owls on a hunt for mice and grasshoppers, the two pieces-de-resistance upon Screecher's menu.

Was it true that a screech owl really dined upon a mouse by gulping it down in its entirety, without carving it first with beak and claws, as does the more daintily table-mannered hawk? We had brought a mouse to the studio in order that we might answer that very question by actual experiment—and answered it was, vociferously in the affirmative. We chose the saucy and bellicose youngster who, by every obstreperous act, proclaimed himself leader of the screecher juveniles, for our eating contest. While he did need some slight assistance from the camera folk in pushing mousey down the "red lane," he really accomplished the feat in brilliant style, as the illustrations show.

Several more tranquil summer days drifted by, and then we came again upon a final visit to the screech owl family—and we were just in time. Two of the most venturesome had already broken home ties and were plucked from nearby limbs. When they, and their three less daring brothers (and sisters, too, we suppose), were gathered in a hat and carried forth into the mellow sunlight, our final portrait was achieved.

In the forests near our orchard live several larger relatives of screecher, which, like him, spend most of their lifetime destroying the mice which cause the orchardist much worry and loss. Portraits of the more common of these owls are presented at the head of this article.

Now that old man Winter will not blow his arctic breath upon us for some time to come, the less intrepid photographer, who confines his picture-taking to the balmy months, should be thinking of getting his camera ready for the current season.

The most important thing in connection with preparing a camera for the season's campaign is the thorough elimination of dust. Especially is this imperative when the instrument has been idle for some time.

(CONTINUED ON PAGE 38)

The Gila Monster

By CHARLES LINCOLN EDWARDS, PH.D.

Director of Nature Study, Los Angeles City Schools

THE GILA (pronounced *heela*) monster, or beaded lizard, is the largest lizard in North America, growing to a length of two feet, and the only poisonous lizard in the world. The common species, *Heloderma suspectum,* is most abundant in the Arizona Mojave Desert. The name comes from the Gila River of Arizona and New Mexico. A second beaded species, the "crust lizard" (*Heloderma horridum*), occurs in Mexico and Central America.

The flattened body of the Gila monster ends in a thick tail and is dragged over the ground by strong, short arms and legs. Each hand bears five fingers and each foot five toes. The muscular tail may be used to balance on or as an added limb in climbing over rocks or, by its spring, the creature may jump as much as two feet at an enemy.

The forked tongue, like that of a snake, vibrates from the mouth, giving to the lizard sensations of touch and of taste and perhaps some others not known to man.

The very tough skin of the Gila monster is covered above with fine, bead-like granules, together with many irregular bony elevations, instead of the usual lizard scales. Below there are flat scales. This animal is strikingly colored with mixed patches of blackish-brown and pink, yellow or orange. The lighter color may vary from salmon pink to pale yellow, or even white.

The beaded lizards live in dry places, hidden by day and become active in the evening. They lie asleep during the hottest part of the year. They eat frogs, worms, centipedes, ants and other insects, as well as the eggs of frogs, birds and other lizards. In good times the extra nourishment is stored up as fat in the tail. When food is scarce this fat can be absorbed and carried to the hungry cells through the blood and thus the Gila monster may go without other food for several months.

In midsummer the female lays from six to thirteen soft-shelled eggs in a hole scraped out of the damp sand near a stream and then covered. After being incubated in the sun for about four weeks the young are hatched. They are four inches long and brighter colored than the parents.

Usually the Gila monster moves awkwardly and lazily over the hot sand of the desert. While not at all timid, he may lie perfectly still and feign death. If stirred by passion or fright he runs swiftly and pants his foul breath convulsively. When the Gila monster bites he holds on like a bulldog.

The pronounced swellings on the outer side of the lower jaw indicate the location of the poison glands. Each gland is a transformed sublabial gland made up of three or four club-shaped sacs, immediately under the skin.

THE GILA MONSTER

Although it is feared by Mexicans and Indians, it is said its venom is not fatal to human beings.

The mouth is armed with many fang-like teeth arising from the inner edge of the jaws. Four teeth on each side of each jaw are grooved deeply on the front surface and slightly on the rear. A poison sac opens between the lip and the base of each grooved tooth of the lower jaw.

The venom is produced from nonpoisonous material carried in the circulating blood to the glands. The secretion of venom continues even after the glands have been transplanted into another animal.

By letting the Gila monster bite a strap five or six drops of the whitish, sticky, serpent-like venom may be obtained. The poison mainly acts upon the central nervous system of the Gila monster's victim. The respiratory center is especially affected and death ensues from a paralysis of the breathing apparatus.

Toads and other cold-blooded animals are more resistant toward the venom than rabbits, guinea-pigs and other warm-blooded creatures.

A more or less heated debate has extended over the last seven or eight decades concerning the fatal quality of the Gila monster's poison.

Most Indians and Mexicans have a superstitious fear of this lizard as a most dangerous animal.

(CONTINUED ON PAGE 30)

Wood Used in Games and Sports

By RICHARD W. WESTWOOD

CRACK! Bat meets ball and drives it out in a line over the second baseman's head—a perfect "Texas Leaguer." Click! The little white ball leaps away from the tee and curves gracefully to rest in the middle of the fairway. Swish! The paddle cuts the water and the canoe slides around another bend in the river. Whir! The big trout sends the reel a-whirling and the supple pole bends and sings in the hands of the fisherman.

Wood! Can you imagine swinging at the horsehide with a steel bat? What greater joy than a perfect follow through with a resilient wooden driver? Would you choose to set out on a camping trip in a tin canoe with an aluminum paddle?

In more than thirty varieties, about twenty-five million feet of wood go every year to provide us with skis and billiard cues, snowshoes and tennis racquets, candle-pins and bows and arrows and many other things. Wood does its bit to keep us healthy, amused and lovers of sport and the out-of-doors. Our hickories, elms, maples, oaks and ashes contribute many million feet of timber to a sport-loving nation. Even cherry, holly and dogwood play their part.

History does not relate what kind of a bat "the mighty Casey" used that day when he shattered the air with a third strike and spread gloom in Mudville. The chances are that it was ash. The wood of this tree has won the approval of the kings of baseballdom, who select their weapons of offense with knowing eye to weight and strength. Ash seems best to meet the shock of a long drive into the bleacher seats. Willow vies with it for high favor in less exacting baseball circles. Out in the sandlots, and on diamonds with stones for bases and many holes in center field, the coming stars of college and league may play with bats of beech, maple, elm or other wood.

Probably no other follower of sport is more critical of the tools of his amusement than the golfer. The shaft of his club must be tough yet elastic. The heads of the wooden clubs must be hard and heavy enough to send the golf ball sailing. Great care must be used in the selection of shaft and head, and

ADVANTAGE OUT, THE SET DEPENDING ON THE PLAY

The wood chosen for the tennis racquet must have strength to stand the slashing of a back court drive.

A LONG PUTT TO HALVE THE HOLE

Trusty wood must go to make the golf club although the woods along the fairway often rouse the golfer's ire.

hickory is out in the lead as the wood for the handle of the golf club. It has nothing to fear from such foreign wods as greenhart and hornbeam, although it has various grades, and the quality of the club depends upon the careful selection of these grades.

When a golfer stands back on his heels and takes a healthy drive at a golf ball it means considerable of a blow. The wooden head of the driver has got to transmit the force of this blow without splintering off in several directions. So club makers have finally come to the conclusion that persimmon and dogwood combine the needs of strength, hardness and weight. Lignum-vitae, maple, beech and birch are also used, but the discriminating golfer does not favor them as much.

Not unlike the violin, the tennis racquet is made with careful choice of wood. The best of them are made with bentwood rims selected for their perfection. Ash and hickory have an almost equal popularity as woods for this part of the racquet, although elm gives service if not as much finish to the racquet. The bow must have strength to hold the lacings during slashing backline strokes, cuts and volleys. In making the handles of the racquets two woods are generally used. The lighter-colored woods are light in weight as well, while the darker finishings may be of rosewood, walnut, mahogany or cherry.

Somewhat similar to tennis in the form of its paraphernalia is lacrosse. This old Indian game still depends largely upon Indians as the makers of the lacrosse sticks. These are made almost entirely of hickory, which seems alone to be strong enough and tough enough to stand the catching and throwing of the ball in the net attached to the hickory frame. The Indians used to play the game *en masse,* using knots of a tree as a ball and frequently ending up in a riot.

WHAT WOULD THIS SCENE BE WITHOUT WOOD?

Canoes, paddles, rowboats, wharf, diving board and flag pole, all of wood—not to mention the welcome shade along the shore.

Suppose that suddenly one day a law went into effect prohibiting the use of all articles made of wood in sport. The chap just starting off on a camping trip in his canoe would be the hardest hit. Being a law-abiding citizen, he would take out his favorite bamboo fish pole to be left behind. Then he would remember those clever little imitation frogs, minnows and beetles, made of red cedar, that he had bought for fish bait. If he had any bird decoys, also fashioned from red cedar, he would have to leave those behind. Then the slender, sup-

ple paddles and the backboards would have to go. Finally the law-beset camper would look sadly at his canoe, whether its frame and body be made of black walnut, butternut, sycamore, ash, cherry, cedar, sassafras or birch bark, and give up the trip—or break the law.

It would, indeed, be a sad gymnasium without

CHUCKING UP FOR THE CHAMPIONSHIP SERIES

Ash is king of woods in the baseball world, although willow vies for favor and beech, elm, or maple are often used.

wood. While some of the apparatus makes no special demands, many details have special requirements. When you swing the Indian clubs and lift the dumbells your exercise is with sugar maple, which is heavy and looks well. Birch or beech also serve the purpose, as well as certain other woods that can combine these qualities. The trapeze demands elm, ash and hickory. Spruce will serve you best when you swing on the horizontal bars. You will shinny up and slide down a climbing pole of yellow pine and do some arm-twisting swings from strong hickory rings.

In the billiard and pool room we find some more carefully chosen woods made into tools of sport. The cues are important, for they must do their part in giving speed and accuracy to the balls. Generally maple is used for the main part of the cues, and the inlay work on the handles may be any dark wood such as walnut, mahogany, rosewood or ebony, or even holly dyed black to give the effect of ebony. The table may be made with oak, chestnut, cherry, walnut, mahogany, or rosewood. The little buttons strung on the wire above to be flicked along as you score, will probably be fashioned from maple, beech or paper-birch.

After a game of billiards you may seek more strenuous diversion in the bowling alleys. Down the smooth, polished floor of maple or longleaf pine you will roll balls of lignum vitae, unless the proprietor has substituted composition balls to save money. A strike, and all the little group of maple wood pins are swept away for the pin boy to set up again while you proudly record your feat on the score sheet.

Whether you are slipping across the snow on skis, treading on it with snowshoes or shooting down the iced track on a toboggan, you are depending on wood. When you shoot out into the air from the ski jump you need long, point-curved skis that are stiff and strong, yet elastic. The demands of the toboggan are much the same, and spruce, ash, hickory, elm, beech, birch and maple are found to fill the bill better than any other woods. To stand the strain of the thongs as you plump one snowshoe down after the other, a strong rim of elm, ash or hickory is needed. Many of the trappers and hunters of the north woods expertly use the bark of the basswood tree in place of leather thongs.

While archery is not a sport in which many of us indulge, it makes special demands for wood. Bows of yew, such as the archers of England used before the days of powder and bullet, are the best today. The early colonist dodged arrows shot from

Indian bows fashioned from hornbeam, hickory, orange, ash, cottonwood and locust. The arrows were, and still are, made of any straight wood, but the bows must be expertly made of tough and springy wood.

Love of more vigorous sports and the popularity of the evening auto ride have joined to doom the vogue of the post-prandial croquet game. Yet it still has many adherents and a great deal of wood goes into the making of mallets, stakes, balls and even wooden wickets. Maple is the popular wood but specially fine sets have mallet-heads fashioned from teak or lignum-vitae and handles of a variety of tough and springy woods.

TOUGH HICKORY DOES THE WORK IN A LACROSSE STICK

The Indians still make these sticks as in the days when they played this game en masse, frequently ending it with a riot.

Wood enters directly and indirectly into many sports. It provides the floor and net boards of the basketball court. It is found in the squash and handball courts. Special woods, well-fashioned, make boats for the lovers of motor boating and sailing. Wood makes surf-boards and springy diving boards. It goes into shells, slides and oars for rowing. We find it in the ping-pong sets and in tough, sturdy hockey sticks. Eventually, no doubt, the airplane will become more an instrument of sport, demanding woods of special fitness for propellers and frame.

Wood is fashioned in many ways to make games. There are dominoes of wood, and checkers. Yes, even the nerve-wracking game of jack-straws. Special woods, polished and cabalistic, are being made into East Winds and North Winds for our latest national affliction, Mah Jong. Without wood, indeed, we would have to do much contriving for amusement and exercise.

The Gila Monster

(CONTINUED FROM PAGE 26)

Old settlers have given instances of death occurring within forty minutes of the Heloderma's bite. In one such case the fatality was proved to be due to chronic alcoholism. In another the probable cause was heart failure from extreme fright rather than the Heloderma venom.

Dr. Leo Loeb, in his important contribution, "The Venom of Heloderma," published in 1913 by the Carnegie Institution of Washington, affirms that "no death of a human being has come to our knowledge that can be attributed to the bite of a Gila monster. A bite of this animal is in man either followed by no symptoms or by a local swelling."

Mr. Joseph S. Edwards, of Los Angeles, has kept many individuals of both species of Heloderma for more than twenty-five years. They have been perfectly gentle and never offered to bite. They are handled as unconcernedly as if they were fence lizards.

Mr. Edwards allowed a Gila monster to fasten his teeth in the wing of a chicken and hang on for some time without any consequent injury to the chicken.

On the other hand, a man whose absorptive tissues had been well saturated with alcohol for a number of years was bitten by a Gila monster. The man recovered without the slightest indisposition, but the poor Heloderma, not having been gradually immunized to alcohol, soon died from the noxious dose.

Some Curious Birds

Description by

HARRY C. OBERHOLSER, *Biologist, Biological Survey, U. S. Department of Agriculture*

Curassow

The bushy crest of this large game bird gives it a distinguished appearance. The males are black; the females largely of a chestnut color. It is a wary bird of the forest, in Mexico and Central America. It hunts its food much on the ground; but unlike most gallinaceous birds it builds its nest in trees.

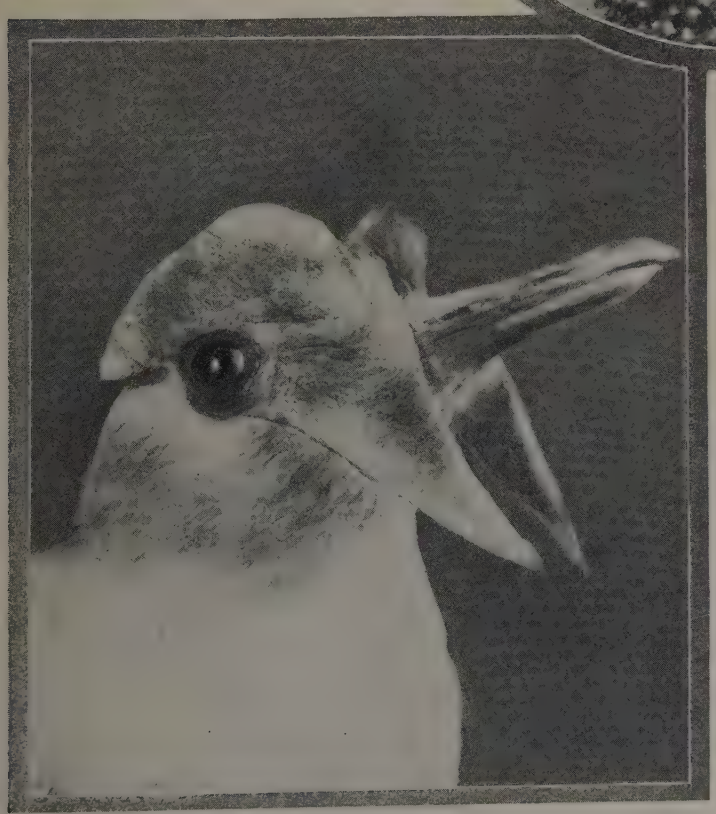
(PHOTOGRAPHS BY INTERNATIONAL NEWS REEL)

Masked Plover

The long bright yellow face wattles have given this bird its name. The masked plover is further interesting on account of the long spur on the bend of each wing. It lives in the Molucca Islands, New Guinea, and the northern part of Australia. Its habits are similar to those of other plovers.

Secretary Bird

The fanciful resemblance of the long feathers of this bird's crest to a quill pen thrust behind the ear suggested the name "Secretary" bird. This bird's habits, however, are far from literary, as its business in life is hunting snakes and other similar animals. It is an African; and is one of the largest birds of prey.



Superb Bird of Paradise

This is one of the most remarkable of all that famous group known as birds of paradise. It is only nine inches long, velvety black with purple and green metallic ornaments, including a large bright metallic green pectoral shield and another large forked velvety black erectile shield on the back of the neck. Like most of the birds of paradise it lives in the island of New Guinea.

Crested Grebe

This, one of the largest of the grebes, is notable for its double crest and bushy neck frill. Its wide distribution extends from Europe and Asia to Africa and New Zealand. Its nest is a floating mass of water plants. The parent frequently covers the eggs with vegetation when leaving the nest; and when swimming often carries the young on her back.

Crowned Crane

This African bird derives its name from the curious fan-shaped straw-colored crest of wiry bristles that adorns the back of its head. This crest, with the long neck, bare face, and bushy black feathers of the top of the head, give the bird a striking appearance. In its grayish general coloration and in habits it is very similar to other cranes.

Bald Ibis

The curious appearance that the bald head and neck of this bird gives it is heightened by the bright red coloring of the top of the head and the pale blue of the neck and sides of the head. The general color of the plumage is metallic green. This rare ibis is a native of the mountainous parts of South Africa. It is shy and comparatively little known. It feeds largely on insects.

California Quail (RIGHT)

The California quail is the handsomest upland game bird in North America. Trim, and about 11 inches long, its gray coloration is set off by markings of black, white, rich brown, and tawny. It is native from Oregon to Lower California; and has been introduced north to British Columbia. It lives in brushy localities and after the breeding season gathers into large flocks or "packs."

Green Wood Quail

The long, hairy, reddish crest gives this moderately sized, rich green plumaged bird a distinguished appearance. In its native haunts, from Siam to Borneo and Java, it is a lover of the tropical forest up to an altitude of 4,000 feet, and seldom visits the open country. It moves in small flocks and feeds largely on berries, seeds, and insects.

Crested Ibis

The full drooping crest distinguishes this handsome ibis. The bird itself is about 2½ feet long, of a generally cinnamon brown color with markings of black and white. It is found only in eastern Madagascar, where it lives in the forests. It feeds largely on worms, which it extracts by probing the ground with its bill.

Malayan Fire-backed Pheasant (LEFT)

This beautiful bird, found in the Malay Peninsula and Sumatra, is, in the male, chiefly bluish black with two white tail feathers, and a fiery bronze red rump, whence the name "fire-backed." It is a denizen of the dense tropical jungles and overgrown clearings of the low country, and is shy and difficult of approach.

Bell Bird (RIGHT)

The famous South American bell bird is ten or more inches long and entirely pure white in plumage. The strange erectile caruncle at the base of the bill is three inches long. It has loud metallic notes, which are audible for a long distance, and which have suggested its name. It lives in the dense forest, and is much more often heard than seen.

Diard Fire-backed Pheasant

The male of this pheasant is largely gray, varied with black, white, and chestnut, with a shining gold back and bronze red rump. The female is brown. The bird inhabits Siam and French Indo-China. Here it lives in the dense bamboo thickets and forest jungles, on account of which it is with difficulty observed.

Maleo (RIGHT)

This notable bird is a native of Celebes. It is chiefly of a brown color, with salmon pink posterior under parts. The most curious thing about the maleo is its nesting habits. The eggs are laid in holes in the hot sand of the beach, covered, and left without further care. When the young hatch they dig their way out and fly off to the forest.

Hoopoe (LEFT)

This peculiar bird is about eleven inches long, of a dull rufous or tawny color, varied with black and white. Its name originated from its strange call. It is a native of parts of Europe, Asia, and Africa, where it is often a familiar bird. It feeds mostly on the ground, but nests in a tree cavity or a hole in a bank.

ADVISO TOWNSHIP HIGH SCHOOL LIBRARY MAYWOOD, ILL.

DESTRUCTION LEAPING ACROSS THE FOREST FLOOR

Born of carelessness, flying spark or spearing lightning, the forest fire lays waste before it, robbing today and tomorrow of their wooded wealth.

It Ain't Worth Nuthin'?

By ARTHUR NEWTON PACK

OUR HORSES stood breathing heavily after the mad scramble to the top of the trail and indeed we ourselves were glad of the breathing spell and an opportunity to look around at the marvelously unfolded panorama of forest-covered hills below.

Marion suddenly pointed with her crop, "Look, there's a forest fire just starting on that next mountainside. I wonder if anybody has seen it? Let's go down and tell them."

We were both only too glad of this opportunity to prove our sudden enthusiasm and interest in forest protection. In the valley beneath we found a group of two or three typical mountaineers' houses, entirely guiltless of any sign of paint, and populated indiscriminately with children, chickens and, apparently, a couple of pigs.

"Where is your father?" asked Marion of a very dirty-faced little girl who alone had shown any interest in our arrival.

"Paw is up there in the clearin'," we were told, and hastily made our way to where the head of the household was diligently struggling with a weather-beaten horse, an old plough, and a world almost entirely populated by stones. Our information that there was a fire started in the bush half a mile up the valley met with no enthusiastic response.

"Sure, I reckon if there's one fire there's prob'ly half a dozen 'round here somewheres. The' always is at this time of year."

"Doesn't anybody try to put them out?" inquired Marion.

"Naw, 'taint worth the trouble. The timber up there ain't worth nuthin' anyhow, ain't been any timber 'round these parts since the company got done loggin', come ten years. What stuff's there ain't worth nuthin'. Might's well let it burn up frequent, then we ain't so likely to have a big fire as 'll do some damage to the farms. Not as I s'pose that would hurt either. You can't raise much crops on this rocky land."

That was our first experience with an Appalachian forest fire. It was repeated many times for, just as the farmer had predicted, every day

of the dry season saw new outbreaks, from what careless source no one seemed to know nor care. There was a watchful government ranger on the other side of the divide, for the land over there belonged to the Government and was part of one of the Appalachian National Forests. The ranger, however, had all he could do with the fires on government land and had neither time nor occasion to concern himself with the dozen odd bush fires which were continually visible from our favorite mountain trail.

GREAT QUANTITIES OF PULPWOOD DESTROYED BY FIRE

Started by a careless camper, fire swept the forest growth from this Appalachian hillside, doing several thousands of dollars damage.

"It ain't worth nuthin'." That seemed to be the general answer ever ready on the lips of the native population. Of course it wasn't—a few scattered cull hardwoods interspersed with scrub pine and thickets of young second growth were not worth anything today, yet every once in a while, when our daily rides would take us around a bend in the road and open up a new panorama, over there on the bench land, where the valley began, we would see a dozen or so fine old white pines with their bluish-green needles standing out in beautiful contrast to the yellow-green of the scrub and the struggling new-leaved thicket. Probably a close inspection would reveal that the trunks of those largest trees were defective in some way, thus explaining the failure of the lumberman's attentions ten years ago. Why were not these patches of available lumber spreading? Where were the more valuable species of evergreens and hardwoods?

Marion knew. "Do you suppose that old grouch in the valley would say children ain't worth nuthin'?" she raged. "Probably he'd just as soon see them burned up just because they weren't old enough to have an earning capacity. He won't protect the tree children and give them a chance to become valuable."

I laughed at the first part of the remark and thereby brought down her righteous indignation upon myself. "No, and you wouldn't wait for the vegetables you planted last spring to bear, but let the weeds choke them out while you played golf," she added. The fight was on, and for a moment it seemed as if a happy vacation would split on the very rock which stood to wreck the ship of forest conservation. If only broad policies of conservation could be settled as easily as momentary quarrels! They are; they are settled in the very same way by simply forgetting the issue, and that is why the American forestry problem, which is 90 per cent the forest fire problem, has not yet been given a definite solution.

Four or five days later Marion and I rode over the divide to call on the government ranger. He was a wonderful old fellow who did his work and did it well because he loved it. Certainly it seemed to us that Uncle Sam offered him neither salary nor opportunity of advancement sufficient to command a man's life work. Dan, as everyone called him, was eager to talk. He told us that "our

woods" had been inspected three years before by the government engineers and accepted by them as suitable for inclusion in the Appalachian National Forest area. If the land had been taken over then and protected, it would already be exhibiting to the careful eye a much better appearance. Why hadn't it been done, we asked. Dan's eloquent remarks about politics and politicians would have been enough to lose him his job had there been political ears to hear. It seems as if every American was proud of his right to find fault with his elected representatives. Dan, however, did carry his conception of the problem further. Elected representatives are supposed to do what their constituents demand. Are those constituents taking sufficient interest in the matter?

THE FIRE-FIGHTING RANGER

This forest officer is equipped with complete fire-fighting apparatus including shoulder pack, water bags and canvas buckets.

According to our forester friend they are not. Glad of an appreciative audience, he smacked his fist on the little table until the instruments to aid in locating fires jumped and rattled. "I like a good ball game and all that, but if exercise is what people want, believe me, more of them can get it to good purpose learning something about the outdoor things that belong to them. The American people haven't got the right attitude toward the out-of-doors!" Marion suddenly remembered the old argument about that vegetable garden. She looked at me with a half smile. "I told you so," she said. But I had just begun to see. Others are beginning to see, too, and Marion and Dan may both have to take it back.

The Screech Owls and Their Kindred

(CONTINUED FROM PAGE 25)

The inside of the bellows should be carefully gone over with a fine camel's hair brush, and the lens wiped with a soft cloth—one that will not scratch.

Be positively sure also that the shutter is functioning properly before attempting to make pictures; if it is not, by no means try to repair it yourself. The mechanism of a camera shutter is far too delicate for the handling of anybody but an expert trained to the work; send your camera to the factory and have the trouble taken care of properly. Many a beautiful picture has failed to materialize when the film was developed because the shutter failed to work.

OUR FINAL SCREECH OWL PORTRAIT

Woe to Tookhees, the wood mouse, tonight if he forgets to be cautious, for this pack of winged hunters will surely be hot upon his trail.

Above all, do not put oil on the shutter when it sticks—that makes a bad matter worse.

Wheat, the King of Cereals

By RICHARD WILBUR

GREAT stretches of golden grain. Acre upon acre of tall yellow grass, waving in the breeze. Little brushes enclosing kernels. Machines cutting, gathering, binding and threshing. Towering elevators. Great vessels. The white powder of flour. White-capped bakers. Bread. In wheat Nature has given a great bounty to mankind. We know it as the staff of life. Gathered in sheaves it stands for plenty. With it nations have grown to power. Its history is the history of man's struggle for existence.

The United States today, in quality and steadiness of production, leads the wheat world. This King of Cereals is the nation's chief source of bread stuff. It has pioneered with the pioneers. As the frontiers were flung westward, wheat prospered, following the tide of settlement. Today it grows in considerable measure in the soil of forty-three states. It creates economic and agricultural problems with which legislators, economists and business men as well as the farmer must grapple. Wheat is a living, vital thing.

U. S. DEPT. OF AGRICULTURE

THE KING OF CEREALS

In wheat nature has given a great bounty to mankind.

One day in prehistoric times a man set out with a rude hoe and started to cultivate wheat. We have no evidence that this grain grew wild and was of value without the help of man. Nature, as with many of its gifts, gave the means, leaving it for man to find the way. Grains of wheat have been found in the tombs of Egypt, and ancient records chronicle its cultivation and use for food.

So far as is known Columbus found no cultivated wheat in America. Cortez is believed to have discovered a few grains mixed with the rice in his provisions and to have planted them. Bartholemew Gosnold had grains with him on his explorings, planting them on islands off the New England coast. The colonists in Virginia and Massachusetts set about the cultivation of wheat, and Baltimore became the first great wheat port of the new world.

Northern New York became an important wheat raising section, supplying Washington's army. Washington himself was proud of the wheat that was raised and milled on his estate, and the Mount Vernon brand was a peer of flours. As new states came into being, so did new wheat states appear. The plains of the west were found to be fine wheat producers. The Civil War stimulated wheat raising, and 1862 saw the then unprecedented production of 186,000,000 bushels. Four years later the output passed the 200,000,000 mark, never to go below that figure.

Wheat belongs to the grass family. Its particular family name is Hordeae, and if the system of the genealogy books were followed four main branches would be found: Common wheat, Egyptian or English wheat, Flint, Durum or Macaroni wheat and Dwarf wheat. The family tree would show many offshoots from each of these groups: wheats with interesting names like Turkey Red, Blue Stem, Scotch Fife, Golden Chaff and Bearded Winter Fife; red wheats and white wheats; winter wheats and spring wheats; hard wheats and soft wheats.

Through centuries of cultivation, in varying climates and in different soils; through experiment; through crossing and mixing, myriad kinds of wheats have developed. They are known as red, white or amber, depending upon the color of the kernels. They are bearded or beardless, depending upon whether or not the little pods clustering

around the stem are adorned with spikelets like the whiskers of a cat. Names are given to distinguish wheats with white chaff from those of red or brown; and to classify those with little hairs or velvet on the chaff, and those that are smooth.

Almost everyone is familiar with the spiky finger of wheat with pod-enfolded kernels hugging close to the inner stem, much like a tiny inverted bunch of bananas. On the outside the kernel wears an overcoat composed of cellulose. Next is a coat, and then a vest composed of bran. The kernel is still further protected by a shirt of gluten cells. Then comes the wheat kernel itself, with tiny indentations at the bottom where the germ of the new plant is stored. In different kinds of wheat the relative sizes of these coverings and the kernel vary, deciding the wheat's value and use.

U. S. DEPT. OF AGRICULTURE

So far as is known there was no wheat in this country when Columbus discovered it.

There are winter wheats and spring wheats. The former is sowed and gains a foothold in the fall, and the latter is put in the ground in the spring. Climate and soil have much to do with whether a winter or spring crop, or both, can be grown, and so far as variety goes it is the farmer's task to find which gives the best results on his land. Preparation is the same, the soil being loosened from three to eight inches deep with plow or harrow, the modern descendants of the bent stick or wooden plow of early days.

The wheat seed is sown broadcast or by drilling. In the wide wheat fields of the United States, the drill is used, stabbing holes into the earth and emptying seeds into them. If it is a winter wheat crop, a small grass plant covers the field before freezing time, and the roots have taken a firm grip. In the fall there are two dangers, drought and the Hessian fly—a busy pest that attacks the tiny plants near the base. Avoiding these two dangers, the wheat field turns brown for the winter, but with the spring rains comes back the green again, and the crisis of the winter is passed.

Ravenously the wheat eats nitrogen from the soil. Spring wheat is particularly hungry for this and the mineral food that strengthens it. The stems grow rapidly. Strong and self-reliant, the wheat defies competing plants and no weeding is necessary. Gradually the growing plants begin to head out, forming soft grains, plump and full of milky fluid which grows into the solid kernel. The green field becomes a lighter hue. Greens merge into yellows. Finally a golden, undulating blanket of yellow, stretching in some of the great fields for mile upon mile, signals the harvest time.

Reapers and binders sweep across the fields cutting and gathering the wheat in their steel arms.

Giant reapers and binders sweep across the fields, cutting and gathering in their steel arms. Threshers separate the wheat from the chaff. Special freight cars and boats carry the wheat to the elevators, market and mill. The miller takes it to transform it into flour. We get it in barrels or in paper sacks.

The weight and size of the wheat kernel determines the flour yield. Flour made from hard wheat is the chief bread flour. That which is milled from soft wheat is best for crackers, cake and pastry. Durum flour makes a sticky dough fitted for the making of macaroni, into which more than 100,000,-

000 bushels of the output of the United States goes. Graham flour is made from the whole grain ground into powder, while whole wheat flour, not as coarse as graham, is made from grinding what is left after the branny layers are removed.

Although flour is the chief product of the wheat field, the straw is used for fodder, for bedding or for plowing into the field as fertilizer. It is used also in the manufacture of hats and doormats and paper. Grain is not highly valuable as feed for stock, although it is frequently used when wheat is overproduced and low in price. Farmers in Nebraska this year have found corn a more valuable crop than wheat and some stock has had a wheat diet. The more or less recent vogue of bran, and specially constructed and advertised grain foods, has created a market for shorts and bran from milling. The wheat output of the United States in 1923 was 781,737,000 bushels, in contrast with 100,000,000 bushels in 1850. The average for the years 1909 to 1913 was 690,108,000 bushels, and in 1919 the production was 967,979,000 bushels. The war period brought about a great expansion of the acreage sowed to wheat. Farmers concentrated on wheat growing. Today there is a surplus; the price has gone down; Europe has regained much of the lost ground; Canada has continued her increase of production and the wheat grower is faced by the problem of adjusting his crop to changed conditions. This is a difficult economic and agricultural problem that still remains for solution. In the opinion of those who have given study to the problem, the way lies through rotation and reduction of acreage to a point where only enough wheat is raised to supply the home demand and to furnish a surplus that it is possible to market abroad.

Wheat grows to a considerable extent in the soil of forty-three states.

The straw from the wheat field is used for fodder, for bedding live stock or for plowing into the field as a fertilizer.

If ever a pictorial history of wheat were published, it would be illustrated by many and interesting pictures. There would be the rude mortar and pestle and the great mill of today; the cradle and flail and the tractor-drawn reapers and threshers. There would be sad fields of medieval days trampled by armed hosts; feudal lords enjoying rich white bread while their vassals ate the coarse, dark bread of impure making. There would be pictures of war posters urging the farmer to immense efforts of production, and of legislators and economists pondering the way out of the aftermath.

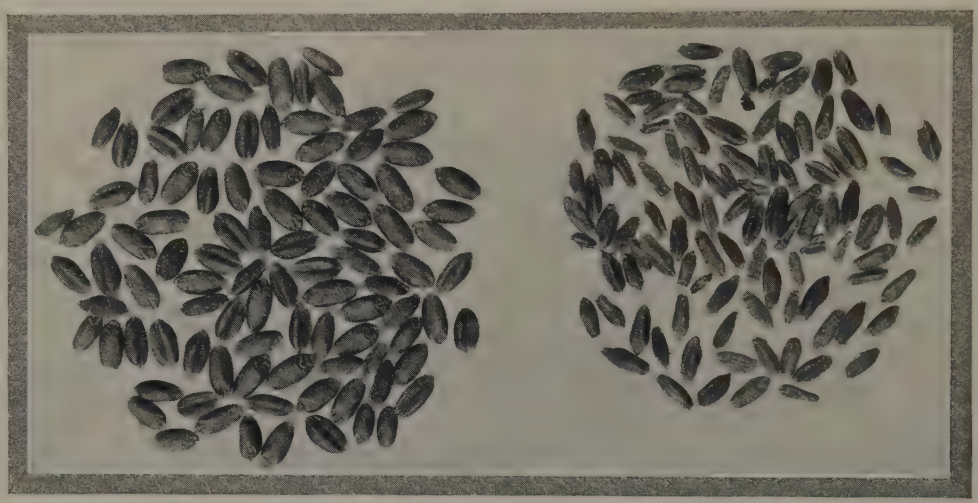
Nature, in making these great gifts to man and his prosperity, gives with them problems for him to solve. With wheat it is as with coal, with cotton, with wool and with others of Nature's bounty. It is possible that it was Nature's far-seeing thought to do this that man might more fully appreciate what was given to him, and make social and economic progress by reason of her bounty.

Wheat's Worst Enemy

By FRANKLIN CROSBY

ASK ANY well-informed school boy what causes typhoid fever and he will tell you that the germ of the disease breeds in filthy places and may be brought into contact with mankind through the medium of the house fly. Ask him about the "flu" and he probably will tell you that the germs may be spread by an infected person coughing or sneezing in a crowded theater or church.

While the young people of today know much of germs that cause human ills, they are not so well informed about plant diseases, almost equally as important and fully as interesting. How many know that black stem rust of grain, annually taking a toll of some fifty million dollars' worth of potential food products in the north central states, is a disease which can be curbed by tactics similar to those employed in combating typhoid fever?



GOOD WHEAT AND WHEAT THAT IS INFECTED

At the left is a handful of wheat from a healthy plant, at the right is some from a plant stricken with the Black Stem Rust.

In the plant world the "germ" of a disease is sometimes known as a "spore." Like the typhoid germ, the black stem rust spore breeds in certain places. Instead of choosing filth for its birthplace, however, its early days are spent on the leaves of the beautiful, common barberry bush, known to many attractive lawns and gardens, and when it leaves the barberry it romps through the fields on the wings of the summer breeze.

Its later life is fully as vicious as that of the typhoid germ. It flits about until it settles on certain grains and grasses, among them the wheat plant. Then it proceeds with its deadly work, much as the typhoid germ breaks down the human system.

The rust spore is the "seed" of the rust plant. Alighting on a stalk of wheat it takes root by sending tiny threads into the stem. These sap the nourishment on the way to the head of the cereal plant, with the result that the kernels are shriveled and ruined for food purposes.

Observing that farmers would soon be unable to profitably raise hard spring wheat in the north central states unless something was done to curb the ravages of black stem rust, the plant pathologists, who are the medical men of the plant world, began to study it and its habits closely. They observed its method of survival from one season to another. Finally they found means to protect communities from it.

The first of the preventive measures urged was the removal of the breeding place of the disease: namely, the eradication of the common barberry bush.

Agricultural experts reached this conclusion after carefully following the progress of the rust plant through its span of life and noting its habits during the various stages of its existence. First they ascertained that the rust plant is a member of the fungus family. The fungi are frequently parasites; that is, they do not get their nourishment directly from Mother Earth, but take root on other vegetation. They sprout, mature, and have seeds.

When the tiny rust plant is maturing it is in the stage best known to most people. About this time it is observed in mold-like streaks on the stems of grain. These black streaks contain thousands of the rust seeds, or spores, as they are called. They remain on the straw and stubble throughout the winter. In the spring they germinate, but the resulting plant in turn produces spores which are weak and shortlived. These early spring-time spores have no power to infect grain directly, and unless the wind blows them to a common barberry bush they soon die.

Once on the barberry they are on fertile ground, taking on a new lease of life. Each little spore grows in the leaf tissue until it produces an orange-yellow cluster cup which contains a new generation

of spores. These cluster cups may be seen on the leaves of the common barberry in the spring. In a short time the cluster cups break open and the wind starts the spores on their career of destruction. They alight on grasses, wheat, oats, barley and rye, sending out their thread-like roots and absorbing the food meant for the grain kernel.

In the early summer, rust is brick-red in color. At this stage the weather is an important factor in the development and the spread of the disease. It "grows" best in warm, muggy weather. Under these conditions every little rust spore leaving the barberry bush and settling on certain grains and grasses produces a new generation of thousands of additional spores, each, in turn, creating large families of their own every eight to ten days. Thus millions and millions are ultimately developed.

Under certain weather conditions these spores may soon infect all the grain growing in the vicinity. The distance they travel may be judged from the fact that last summer a plant disease specialist traced infection from one common barberry bush for a distance of fifteen miles. Spores have even been captured 6000 feet in the air on gelatin-covered slides exposed from an airplane. When brought down and placed on a wheat plant these spores immediately took root.

The rust plant does not survive, however, in cool, dry weather. Fortunately, the weather that is unfavorable for rust usually is favorable for cereal crops. Thus it is that the grain sometimes escapes serious damage even when there is a fairly heavy rust infection in the fields.

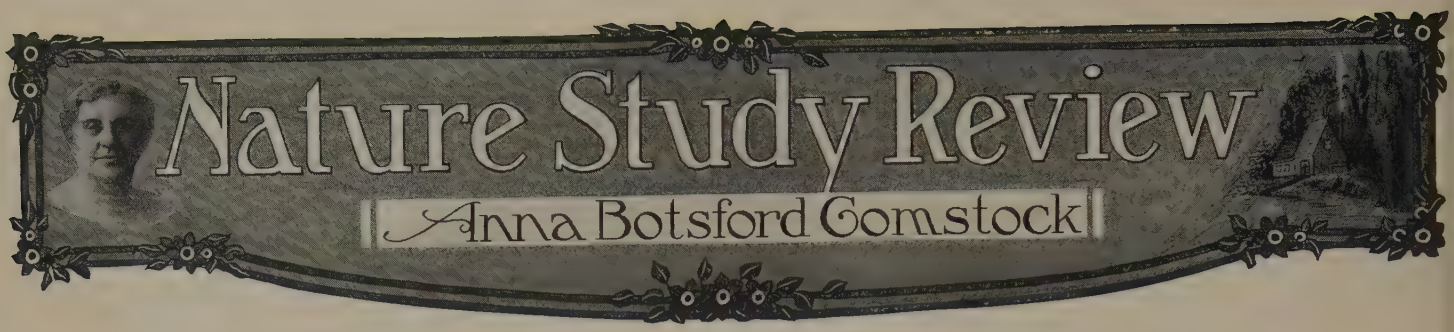
The influence of the weather on the development of rust has caused many to believe that it alone is solely responsible for it. Frequently the presence of rust is not noticed until it reaches the black stage, which means that it is maturing. This is usually noticed right after a period of warm, muggy days. But no amount of hot, muggy weather would cause rust in the fields if the rust spores were not there in the first place. The weather, of course, cannot be controlled. Therefore the only logical solution is the eradication of the common barberry bush, the breeding place of the rust spore.

There are two good methods for removing the common barberry. One is to dig it up, being sure to get every bit of the roots. A bit of root left in the ground may send up sprouts furnishing a spring-time home for the rust spore. A more certain method than digging is to pour ten to fifteen pounds of common rock salt upon the roots of the plant. This will put an end to its career for all time. It is dangerous, however, to use the salt when there is other shrubbery in the immediate vicinity, as rain may spread it for a few yards and roots of neighboring plants will thus be injured.

THE HARMFUL BARBERRY

This well-known plant feeds the Black Stem Rust, which destroys fifty million dollars worth of grain each year.

The common barberry is the dangerous barberry; the Japanese, the harmless. The common barberry is a tall, erect, spiny bush, often as much as ten or twelve feet high. The leaves are green or purple and have saw-tooth edges. The spines, or thorns, are usually in groups of three or more. The yellow flowers are small and seldom noticed, but the red berries, which grow in long clusters like currants, readily attract the eye. The bark is grayish. The Japanese barberry is similar in many respects but is much smaller and the bark is reddish.



Can You See?

By DR. NATHANIEL STOWERS

CAN you see? Of course you can! Even though you are short-sighted or cross-eyed you still have sufficient vision to recognize your friends, to read the paper, to add a column of figures, or to drive your automobile. *But how much can you see?* Are you blind when you enter any fields which are different from those through which your daily rut happens to lead you?

The average person today can recognize the make of an auto going by at forty per; but he only knows the dandelion because he digs it out of his lawn, and the violets because they cost him five dollars a bunch. He can quote you the market price of Liberty Bonds and a dozen other securities; but he only knows the sparrow, the crow, and the pigeon. He reads the latest novels and attends the nearest movie; but he never heard of the "Book of Nature" or witnessed the "Birth of a Butterfly." He can see a pretty girl half a block away; but he only knows one way to recognize a skunk, and then it is too late. His knowledge of minerals is limited to the diamond he must buy, the coal he must burn, and the granite slab he must ultimately rest beneath. The average man is deficient as regards any knowledge of nature.

Here is your opportunity—you collectors and readers of NATURE MAGAZINE. The next time you take a trip ask one of your average-man friends to go with you. Don't tell him why or he will think you a new species of nut and refuse to go; just take him along and talk money or business or whatever he wants. But between sentences call his attention to the peculiar spot on that tree ahead. He probably will not be able to see it until he gets so close that the frightened spot takes flight and discloses a brilliant pair of hindwings. The natural protection of these underwing, or catacola, moths is so perfect that an expert is often fooled, and the quick flash of color when they fly will prove a great incentive to the beginner. After this your friend will be fooled by every patch of moss, or wad of pitch, or bunch of gypsy eggs. When you reach a stone wall show him that little pointed brown head sticking around the corner of a rock; it will be the first chipmunk he ever saw that wasn't stuffed. After climbing the wall turn over a stone and see the ants and termites running around. Then pull down a branch of an oak tree and look for the little tunnels of the leaf-miner moths, made by caterpillars so small that the naked eye can barely see them. Walk a little deeper into the woods and pick some lady's-slippers; he will appreciate these because they don't cost him ten dollars a pair. Now proceed toward that hammering noise and find a red-headed or downy woodpecker relieving some tree of its pests. Finally plunge into some dense thicket and discover a little brown house full of naked open-mouthed babies waiting for their parents and a juicy worm.

By this time your guest has forgotten all about business and is asking you questions which you cannot answer. On the way home he will wear his eyes out trying to look everywhere at once. Next week you won't have to urge him to accompany you, and the week after he will be asking you to take him, or going alone. You have opened a man's eyes, broadened his field, and entered unheard-of riches in his life account, for, as Emerson says:

"He who knows the most, he who knows what sweets and virtues are in the ground, the waters, the plants, the heavens, and how to come at these enchantments, is the rich and royal man."

The Cholla, the Pest of the Desert

By ANNA BOTSFORD COMSTOCK

THE IMPUDENCE of this cactus is so insistent that the first step into its domain reveals its character. There are several species of Cholla (pronounced *choy-ya*) but the one known to science as *Opuntia fulgida* is probably the worst pest of them all because it seems to be more generally distributed and more abundant. Little the Cholla cares what name man has given it for it carried on its cruel warfare against beast and men thousands of years before it had a name; and after experience with it, the writer predicts that it will hold its own in arid spaces until the sun grows old and cold.

It is difficult to describe the Cholla fairly; it is so prickly that even words shy off at the very thought of it. However, in general it may be described as a tree-like cactus with wide flaring top or it may have several thick, clumsy trunks curving away from each other (and no wonder!) that bear a spreading irregular crown. These trunks are green when young but brown in old age; they are set closely with diagonal rows of rosettes of spines; in old age, the spines fall off, leaving a brown, scaly bark. The crown consists of an intricate maze of short green branches or "joints" from three to eight inches in length, their surface divided into angular, regular protuberances something like an unripe pine cone; each of these bulging tubercles bears a rosette of about twelve spines an inch or so in length. The branches are so numerous that they seem packed in at all angles to the main stem and the bristling terminal joints point in every direction.

The spines form the crux of the Cholla's impudence, for they are the sharpest, the most insistent, the most lacerating and the most difficult to remove of anything we have ever seen except the quills of a porcupine. One of these spines, when viewed under the microscope, shows that it is not only barbed at the point but is covered with barbs for its whole length; after it enters the flesh, the most determined pull can scarcely extract it; it will pierce ordinary shoe leather with a readiness hardly believable and will work its way through the thickest clothing. The spines are covered with yellowish white sheaths which protect the barbs and give a remarkable appearance of bloom to these cacti. In passing through a region covered by them, one has the impression that the desert is blooming with whitish flowers. Seen against the sun, the spines set in every direction on the terminal joints, all shining white with the sunlight pouring through them gives each Cholla a silvery aureole as beautiful as ever worn by saint; thus does this satanic plant show its supreme impudence.

PHOTOGRAPH BY F. M. CAMPBELL

THE SILVER CHOLLA

This desert tree has the sharpest, most insistent and most lacerating of spines.

The flowers of the Cholla are light rose pink an inch or more broad, with few petals. The blooming period extends from spring to September and because of this long season of bloom, the blossoming of this cactus is not as spectacular as of most other species. The Cholla fruit is a thick-walled pear-shaped cup that hangs down in clusters from the terminal branches; it often occurs in chains, the fruit of the last year hanging below the ones of previous years. We often find a Cholla that has "turned down her empty cups" for eight or nine years as shown by that number of links in her fruit chains. The fruit is at first spiny, then bare apparently as a temptation to hungry grazing animals. The strange thing about these fruits is that the sci-

entists have never been able to make them germinate under natural conditions; but have succeeded only by breaking open the outside case and germinating the seeds in a conservatory. Perhaps the many little seeds of the fruit are able to withstand the digestive juices of hungry animals and are thus liberated, but this is only a layman's guess.

However, the Cholla does not worry about the germination of its seeds; it has other and better means of spreading its nefarious race. The terminal joints break off very easily; in passing a Cholla, if a thorn touches one's clothing or sticks one of its needle points into one's finger, off comes the whole joint and a dozen spines impale where one did before. Thus animals of all kinds distribute the species widely; moreover a wind breaks off the joints and underneath almost any Cholla there are dozens of these scattered over the ground to the leeward. The action of one of these joints in contact with the soil is most canny; it humps up like a caterpillar until the end formerly connected with the branch comes in contact with the soil, then it sends down roots and lifts its spiny head a pert specimen of impudent infancy. More than this, the pear-shaped fruit will root and grow into another Cholla, ignoring entirely its imprisoned seeds. By these means the Cholla often forms large colonies where they practically take possession of vast areas of the desert on the valley slopes and lower foothills of Arizona and California.

PHOTOGRAPH BY F. M. CAMPBELL

NEST OF CACTUS WREN IN A CHOLLA

Several birds build their nests in the Cholla trees, dexterously avoiding injury from the cruel spines.

The Cholla is probably long lived but one sees individuals here and there in the death throes—the branches, minus many of the terminal joints, hang down dejectedly; someone suggested that its general appearance of despondency was caused by contrition for having lived all its life a Cholla. The skeleton of this cactus is a thing of beauty when it is sun-bleached; its evenly set, graceful-shaped apertures give it the appearance of the handiwork of a Florentine wood carver.

The Cholla is especially cruel to grazing animals, for the pestilential spiny joints are so scattered over the ground that an attempt to get the sparse grass in the infested area results in the encrusting of the lips, nose and mouth of the creature with these terrible spines. Both horse and rider, in passing through the region, suffer almost equally and the pedestrian needs a coat of armor as worn by the knights of old if he would come through unscathed. We gain a new idea of the heroism and devotion of those Spanish priests who established the Arizona missions in the early days, for they must have had to pass through miles and miles of Cholla-infested desert.

There are creatures, however, that have learned somehow to ignore the spines; three birds commonly nest in the Cholla; the Palmer thrasher builds its large cup nest in it; the cactus wren, a brave handsome bird, builds a nest of finest grasses in the very midst of the crown of the Cholla and wisely builds a covered vestibule of several inches, so that she has freedom of entrance; and the charming little verdin builds with the same architecture in miniature. The thickness of birds' feathers make their familiarity with the Cholla understandable; but how can the wood rat whose skin is soft and sensitive build its great covered nest largely with these diabolical terminal joints? Only yesterday we saw one under a great low-branched Cholla; the nest was as large as a bushel and consisted mostly of the Cholla joints, truly a miraculous dwelling.

Chinese Pigeon Whistles

A Unique Orchestra of the Air

By HERBERT BEARDSLY

THE CHINESE lover of birds does not permanently confine his pet in its prison cage, but he takes it out with him on his walks, carrying it on a stick, to which one of its feet is fastened by means of a thread long enough to allow it ample freedom of motion. Where the shade of some stately tree bids him welcome, he makes a halt and permits the bird to perch and swing on a supple twig, watching it even hour after hour with interest and appreciation.

CHINESE PIGEON WITH WHISTLE ATTACHED

One of their most curious expressions of emotional life is the application of whistles to pigeons. These whistles are very light and are attached to the tails of the pigeons by means of fine copper wire, so that, when the birds fly, the wind blowing through the whistles sets them vibrating and produces an open-air concert. On a serene day it is possible to enjoy this aerial music while sitting in one's room. The instruments carried by each bird of a flock of pigeons are all tuned differently.

The whistles are manufactured with great cleverness and ingenuity in Peking. There are two distinct types, those consisting of bamboo tubes placed side by side, and a type based on the principle of tubes attached to a gourd body or windchest. They are lacquered in yellow, brown, red, and black to protect the material from the destructive influences of the atmosphere. The tube whistles have either two, three, or five tubes. The gourd whistles are furnished with a mouthpiece and small apertures to the number of two, three, six, ten, and even thirteen. These varieties are distinguished by different names; thus, a whistle with one mouthpiece and ten tubes is called "the eleven-eyed one." The materials used in the construction of the whistles are small gourds that serve for the bodies, and several kinds of bamboo for the large and small tubes. The various pieces are fastened together by means of fish glue. The smallest whistles are the most difficult to produce, as the work requires time and skill; one man is said to be able to turn out only three instruments a work day.

VARIOUS KINDS OF PIGEON WHISTLES

Spiders' Ballast

By HOWARD H. CLEAVES

(PHOTOGRAPH BY THE AUTHOR. PEN AND INK SKETCH (FROM NATURE) BY MURIEL E. MATTOCKS)

IT WAS a lady's voice on the telephone. She stated that there was a most curious spider's web between her cottage and her next door neighbor's. She said the web was peculiar in that it was ballasted with pebbles! In southern California one meets many strange things in the outdoors—little burrowing owls bobbing and cackling from curb stones near their culvert homes; the dirt mounds of pocket gophers; the nests of trap-door spiders; the endless columns of marching Argentine ants. But here, seemingly, was something even more novel—a spider's web ballasted with pebbles.

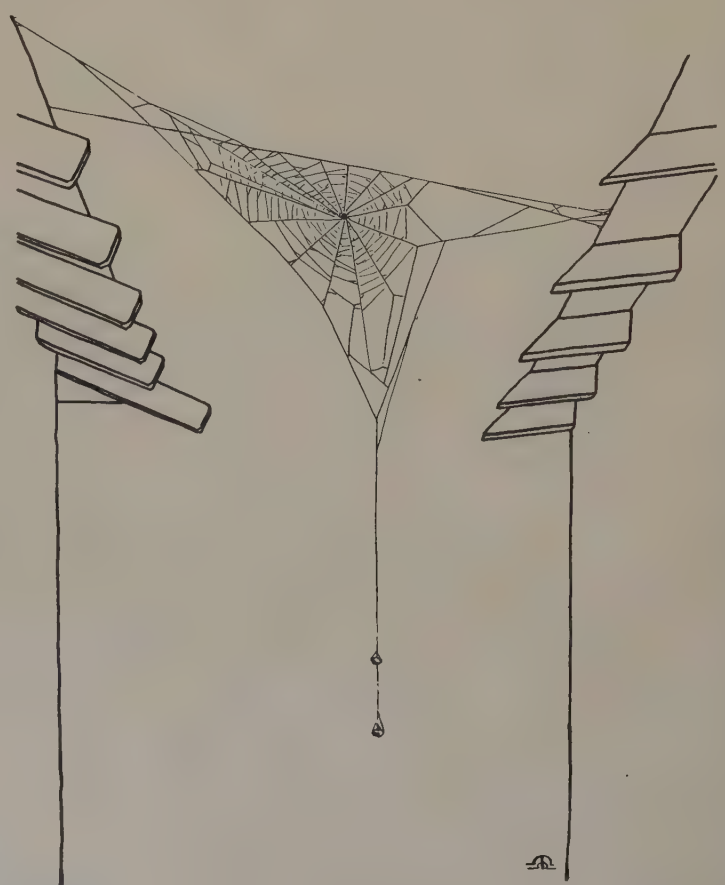
The lady who had telephoned escorted me to the site of the web. There it was, ten or twelve feet from the ground, stretched on a slight diagonal from the eaves of one bungalow to those of another six or seven feet away. It was roughly triangular in shape, the two top corners having their attachments upon the eaves timbers of the two bungalows. But the third corner of the web had no such anchorage. Instead, the line running from that point toward the ground terminated about three feet below the web, and at the bottom of this line were two small pebbles less than half as large as one's little finger nail. They were located seven or eight inches apart. These weights hung like pendant earrings and stabilized the spider's web in the breeze as a lead sinker might steady the tail of a kite.

The lady explained that on the first morning when she had noticed the web with its peculiar ballast there was but one pebble. The following morning a second had been added to the first, the weight of the single one evidently having failed to give sufficient stability. The addition had been made during the night. The ballast pebbles were found to be identical with the small crushed stones which had been used to gravel the roof of one of the bungalows. This roof seemed the obvious source from which the spider had obtained her weights, and a gentleman who lived within one of the houses remarked smilingly that he had a mind to sue the spider if she did not put the pebbles back on the roof!

In the web were the remains of small insects of several species, evidence that it was a successful web and one wisely situated. Madam spider could not be located, so her name remains a mystery. She was doubtless hidden away in some deep, dark crevice during the hours of daylight.

How easily one might be misled by faulty observation and lack of understanding is well illustrated by the account just given. What seemed to have happened had in reality not taken place at all. My friend S. C. Bishop, New York State Zoologist, and an expert in the study of spiders, gives the following explanation:

"In the first place, in order to get the lines across the space between the two bungalows, the spider probably spun a thread of light silk and let the wind carry it where it would. When by chance it reached the point of attachment the spider pulled in the slack, made it fast on the near side and crossed over several times to double and strengthen it. The first line was probably viscid silk: the others dry and inelastic. The next move would be to drop down and make a side support. The spider is rather near-sighted and would have no idea of the distance to the ground, so I presume



How do you account for these two pebbles holding the spider's web taut?

A PHOTOGRAPH OF THE PEBBLES

she simply dropped until she landed on or near the pebble and made fast to it. . . . However, in doubling the line made fast to the pebble, the spider pulled to make it taut and lifted it clear from the ground. If it swayed much in the wind, the spider would drop down to investigate and perhaps add other lines and make other attachments, pulling them tight as before. This would account for the two pebbles. Eight feet is not a great distance for the spider to lift the little pebbles, as I have seen supporting lines at least twenty feet long. McCook figures a web with a mouse pulled up from the floor and one in which a snake was entangled in the same way. Others show the stone ballast, as in the present case.

PHOTOGRAPH BY CHARLES E. GAGE

Gourds are often used in the South for birdhouses. These shown in the photograph are occupied by Martens. A hole is drilled in the bottom of the gourds for the rain water to drain out.

PHOTOGRAPH BY HOWARD H. CLEAVES

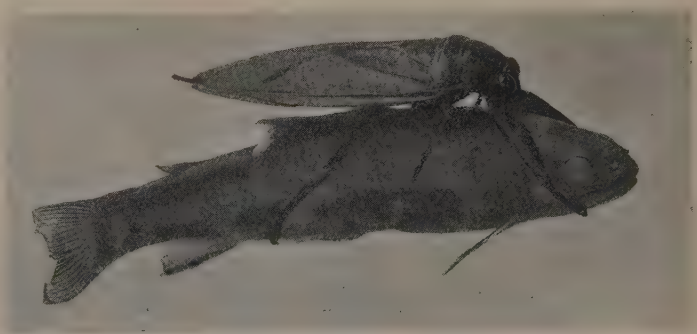
THE LITTLE OLD WOMAN WHO LIVED IN A SHOE

Boyd Everett Burkman, a Staten Island, New York, school boy, made this unique bird house from one of his father's old shoes, which were large in size. The shoe was at once occupied by a pair of house wrens and two families reared. The next year wrens again lived in the old shoe and there reared two more families. Before the third summer arrived a severe storm blew down the apple tree in which this queer bird bungalow was located.

Giant Water Bug Attacks Trout

By H. T. FERNALD, *Massachusetts Agricultural College*

Numerous reports have been made that the Giant Water Bug (*Lethocerus americanus* Leidy) attacks young fish. In April, 1923, one of these bugs was captured at the State Fish Hatchery



GIANT WATER BUG WHICH ATTACKS TROUT

near Amherst, Mass., which had seized a trout nearly four inches long and was so firmly attached to the trout that a photograph of the two animals after death was still possible. The photograph is slightly reduced from natural size.

A Carnivorous Plant

By FRANK THORNE

THROUGHOUT the living world it is the rule that animals prey upon plants. Foods can be made out of inorganic raw materials only by appropriating the fruits of the work after the plants have finished it. In this sense at least, all animals, even cows and sheep, are predatory animals.

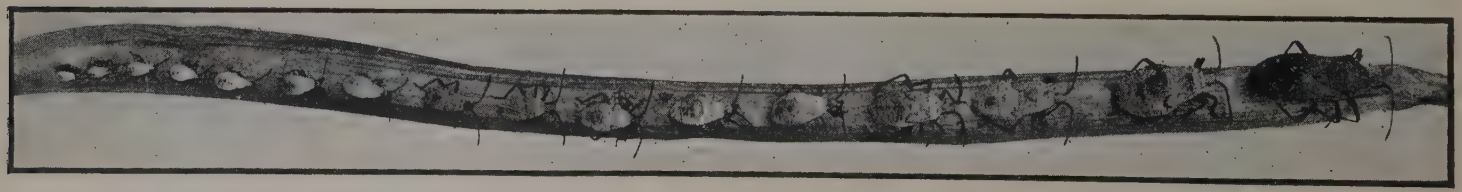
There are, however, a few plants that have partly reversed the usual order of devourer and devoured, and actually capture and use animals as food. They live, for the most part, in boggy places, where the soil is poor in that all-necessary element, nitrogen, and instead of struggling to extract the small amounts of nitrates that are available, they have hit upon the trick, long ago developed by animals, of getting their nitrogen out of the proteins already built up by other organisms.

A PLANT INSECT TRAP

The pitcher plant captures insects, and one is rarely seen without a dozen or so little corpses.

Perhaps the commonest and best-known of these are the pitcher plants. They are very widely distributed, various genera being found in different parts of the world, from the bogs of Canada and the United States to the tropical forests of the East Indies. The leaves are curiously modified into long, hollow, pitcher-shaped structures, with a projecting lip at the mouth, and even a simulation of a handle in the flat extension of the leaf-blade on the side opposite. As insect traps these pitchers are singularly effective. The lip, where an insect naturally alights, is covered with downward-pointing bristles, which permit of easy descent but block any return. The sides of the pitcher near the bottom are also lined with similar bristles, and the walls elsewhere are very smooth and slippery. The pitcher usually contains a little water, caught during rains.

An insect alighting on the lip of one of these leaves has no chance whatever for its life. The bristles make progress possible in only one direction—downward. When the victim reaches the smooth, slippery zone within the pitcher he tumbles into the water beneath, and the bristles surrounding the lower part of the wall preclude any hope of escape. It is a rare thing to find a pitcher plant leaf that does not contain a dozen or so corpses. The illustration shows a good-sized pitcher plant in blossom. The leaves stand in a cluster among the stems of the other bog plants, and from their midst rise the long stalks bearing the striking, odd-shaped purple flowers.



The Apple Mouse

By VERNON BAILEY

Chief Field Naturalist, Biological Survey, U. S. Department of Agriculture

FARMER PIPPIN walked down through his orchard on a smoky September afternoon, with a look of satisfaction on his face. Long straight rows of well-grown, well-kept, and well-laden apple trees, rich in color of golden grimes, deep red winesaps, and dusky black-twigs would have been a pleasing picture for an artist, but to the owner they afforded the additional pleasure of triumph in a long, hard battle against a host of enemies, insects, diseases, frosts, and a stony soil. A good crop and substantial profits were now a certainty.

No wonder his eyes held a satisfied expression, as he examined tree after tree to see how soon the apples would be ready to be picked and stored in clean, new barrels for the market. Yes, it was time to begin, as anyone could tell by the delicious odors of ripe apples that filled the whole orchard and drifted on the wind across the road. Even the passers-by in swift automobiles caught the fragrance and turned their eyes toward the richly colored rows of well-filled apple trees.

APPLE MOUSE, BETTER KNOWN AS PINE MOUSE

This animal is a famous burrower, well adapted by sturdy form, smooth fur, small eyes and short tail, to a life under ground, where it finds abundant roots and bulbs for food and often does serious damage to apple and other fruit trees.

Just over the fence in a patch of blackberry bushes, a chewink saw some old dry leaves on the ground begin to move, and cocking his black head to one side, focused a bright red eye on the spot to see if a worm or beetle had stirred the leaves. Instead of a juicy insect, he saw a little brown nose poked cautiously up from the mellow soil, and two tiny black eyes shine as the blunt nose came higher, and the bristly mustaches vibrated with repeated sniffs of the air. Quickly the nose disappeared and a moment later it came timidly out again, a little higher, and even more eagerly sniffed the air. "Only a mouse," thought the chewink, and went on with his scratching among the leaves. Presently the leaves stirred a few feet nearer to the fence, and the same little brown nose came up out of the ground and sniffed and sniffed the air, then went back, and the opening in the ground closed, and left no signs of the disturbance.

Again and again the same eager little nose came up and sniffed the fragrant air, always nearer the orchard, and always the momentary doorway closed again and disappeared, as the sturdy little burrower dug and pushed and extended his subway just below the surface nearer and nearer to that delectable smell. Now and then he encountered a stone or root that had to be avoided, or a juicy bulb or tender root that furnished a meal, and the tunnel grew with many crooks and curves, but always the general course was the same.

There were resting spells, the longest in the middle of the day and the middle of the night, but by the next evening the apple odor was all around and overhead. He had reached the first tree. Soon a close-up apple flavor penetrated the ground right into his burrow, and a few digs with strong claws and a strong push of the blunt nose broke through the surface right by the side of a luscious yellow apple.

A worm hole showed why this apple had fallen before the others, but oh! how good that sweet juicy apple tasted, as his keen-cutting chisel teeth took the first bite. He ate and ate, rested and ate some more, and then hollowed out a nest cavity nearby into which he drew a bunch of fine dry grass and made a soft, warm nest, with some thistledown for lining. Here he was so warm and comfortable that he just wanted to stay always.

By the next night his apple was half eaten, but he had located several more and felt so rich

that he just wanted to tell somebody about it, so he started back along that winding tunnel. In many places it had caved in or had been mashed flat by heavy feet above ground, but he pushed up the roof again or dug through the hard spots, and by morning had reached the old cross tunnel made during the summer by the rest of his family. In the old familiar runs he soon found the home nest where Mrs. Apple Mouse showed him four little pink new babies without a hair or any visible eyes, ears, or teeth, but he was allowed only one hasty peep before they were covered up again tight and warm.

Soon the news of his discoveries spread, and brothers and sisters, children, grandchildren, uncles, aunts and cousins came flocking around to hear of the feast of apples just over the hill and down in the orchard. Yes, they would all go and go at once, except Mrs. Apple Mouse, who said she would come as soon as the babies were old enough to travel that far, and had cut their apple teeth. She even followed them a little way to be sure which road to take when she was ready to move, and then returned to her babies, the prettiest babies that any Apple Mouse had ever seen, she was sure.

That road to the orchard was soon well worn, and well known to all the mice in that piece of woods, but it was only one of many from other sides of the orchard. All around the edge the underground mouse roads came in and branched in all directions, as Farmer Pippin could tell by the soft, caving feeling under his feet. Many of the apples lying on the ground showed little tooth marks underneath, and he frowned as he said to himself, in a spirit of apprehension: "Wonder if this is going to be a mouse-year."

Finally the apples were all gathered from the trees, and loads and loads of barrels had been hauled away, shipped to market, and the bank account of Farmer Pippin, after all the expenses were paid, had gone away up into four figures. His orchard was acknowledged the best of its size in the rich valley.

There were many imperfect apples left on the ground, dozens of them under the trees, but that did not matter except to the mice, and how they feasted! Mrs. Apple Mouse had brought her four babies, half-grown little Apple Mice, now with sharp teeth and keen appetites; but there were other new families, dozens of them, right here in the orchard where apples were handy and other food to go with them abundant. Such feasting and frolic and visiting back and forth in the safely hidden tunnels! Now the apple pickers were gone and no one mashed down their tunnels or disturbed them; even the old yellow cat had given up trying to catch the little noses that sometimes poked up in the ground, for she got only a mouthful of dirt every time she jumped at one.

So the beautiful fall days went by until one night the cold crept into the ground, and the apple mice were kept busy gathering dry grass to build bigger, warmer nests in their underground chambers. The apples were also getting scarce, and next morning they were hard and frozen, and did not have the usual pleasant taste. All the clover and other green things were hard also, and after awhile they were all soft and wet. All the mice people were cross and disagreeable, and no one enjoyed anything.

PHOTO BY C. CARR

A CASE OF SUCCESSFUL BRIDGE GRAFTING

After a few years the twigs grafted into the live bark above and the live root below enlarge to cover the section from which the bark had been eaten and to carry ample sap for the growth and fruiting of the tree until it has fully recovered from injury.

The next day there seemed nothing fit to eat, and for several days it grew worse and worse, until everybody got so hungry that they began to hunt for new food, most of which was found under ground. Clover roots were not so bad, and wild onions, that had been scorned all summer, were found to be better than nothing. But it took a lot of hard work to dig enough roots for food, and all were so hungry all the time that even poor food tasted good.

There had been other cold nights, and now the ground was all white with snow, such a nice clean blanket of soft snow, it would have been lots of fun if there had been plenty to eat, but the best roots were getting scarce, and what would happen next? The children were all grown up now, but there were such a lot of them, how could they all get enough to eat in this cold weather? The white, frozen world was new to all except old Grandfather and Grandmother Apple Mouse, and they could scarcely remember about last winter, so much had happened since, and they had lost all count of their children and grandchildren, and great, great, great, great grandchildren that had scattered out all over the orchard.

The snow grew deeper, the weather colder, and the food scarcer, but every little and big apple mouse worked hard and got enough food, such as it was, to keep well and strong, if not perfectly satisfied. Then it was that a discovery was made, and who made it or whether they all made it at once is not quite clear; but those big apple trees, with roots running all through the ground, always seemed to suggest apples, and fairly made the mouth water whenever a little brown nose touched a root or the bark. They must be examined and a few bites showed that under a rough shell there was soft, green, juicy bark, with a trace of apple flavor. A little bitter, to be sure, but not half so bitter as dandelions, or many other things they had been eating. Really it was the best food they had tasted for many days, and such a lot of it.

In some places a whole family would gather around a tree and eat and eat, and go away and gather other food, and come back and eat more apple bark until they had eaten all the way around the tree near the ground, and dug down to the roots underground. So it happened one night that great, great, great Grandfather Apple Mouse reached up so high that he was half above the snow, when "whish" came a pair of gray wings; two sets of hooked claws grabbed him and away he was carried by a little mouse owl. All the rest of the family ran in terror and vowed never to show even a whisker above snow again.

Then they ate the bark farther down, on the roots of the tree; and when warm days came again, when the cover of snow all melted and ran away, and the green grass and young clover leaves began to start, they left the apple trees for better food. As fast as possible they worked their way back under cover of grass and leaves to the protecting bushes and weeds and deep layers of last year's leaves; for the ground was full of water and their old tunnels were all so wet and muddy that they could not be used. The little Mouse Owls, the big Hoo Hoo Owls, and even the Mouse Hawks then made such havoc with the Apple Mice that few ever reached the woods again, and these were scattered and scared and discouraged.

Farmer Pippin came down through his orchard in early May, when the trees were in blossom, banks and banks of pink and white, even more beautiful than they were when laden with ripe fruit; but what was that strange ring around the bottom of a big winesap tree? Yes, it was girdled, all the way around, every bit of bark gnawed down to the hard wood. "Mice, as sure as shooting." A chill crept up his spine; he hurried to the next tree. Yes, this one, too. The next was sound, the next also, the next had a large bare spot on one side. The next was completely girdled. The shivers crept higher up his back, and he looked pale, but hurried on over the orchard. Row after row was examined and the girdled trees counted.

A hundred and fifty-five completely girdled, and many others with bare spots of naked wood. It had been a "Mouse-Year"! And all winter no one had known anything about it. The trees showed no signs of injury and were loaded with blossoms the same as usual, but Farmer Pippin knew just what would happen.

By July the sap in the trees would be exhausted, the leaves and fruit would shrivel, and every tree would die; that is, if they could not be saved by the new process of bridge-grafting, connecting the living bark of the roots with that above the girdled space by inserting live twigs. He had heard of this being done, but who would know how to do it? Only a few experts had ever done it successfully, and he had heard that it was slow and expensive work. How could he find out? He would write, no, wire the Department of Agriculture; that office had helped him before, and might be able to tell him where he could find someone skilful enough to do this work, and whether it would save the trees.

Next morning he hurried to town and sent the telegram, leaving instructions to have the reply telephoned to his house. Before night it came. "Yes, trees can be saved. Man in next county is

(CONTINUED ON PAGE 63)

The Edible Crab

By E. GORDON ALEXANDER

TO ONE interested in nature there is a fascination in the study of the blue crab in its native waters. The next time you visit a shallow cove along the Atlantic, south of Boston, look for these crabs. A pair of hip-boots and a glass-bottomed box will add much to your equipment, but beware, for the crab is a very ferocious creature in spite of its small size, and a particularly aggressive individual may bite clear through your boot!

The technical appellation of the blue crab, *Callinectes sapidus,* is decidedly descriptive, carrying with it the idea of a hard-shelled dainty. The common name has been derived from the coloration, as considerable blue is usually present on the upper parts of the body and especially on the claws. The general color of the back ranges from a deep olive or brownish-green to a bluish-green, varying somewhat in the sexes. The under parts are mostly white or cream in color. The same color scheme is followed out with fair regularity in both sexes, but with one interesting difference, that is the color of the chelae, or claws. In the case of the female, these are reddish tipped, while the claws of the male are of the same color as the back, or even darker.

The familiar "soft shell" crab is simply one of these crabs which has recently moulted. Their whole mode of existence makes a fascinating story.

The sexes also differ in both form and size. The abdomen (the apron-like structure folded beneath the body) has the shape of an inverted T in the male, whereas the female's abdomen is quite wide and triangular in form. This is the characteristic by which the sex of any crab is often most easily determined, as the difference in size is noticeable only in the comparison of many individuals. The photograph illustrates the difference very well, however. The male (the specimen on the left) is nearly seven inches in width, the female slightly less than six. These are fairly large specimens, those found in the markets of Atlantic coast cities averaging somewhat smaller.

When man considers the crab's minute beginning, he cannot help wondering at the powerful forces brought to bear to cause its development. The eggs of the blue crab when extruded from the body of the female are so small that one hundred of them placed side by side would make a line barely an inch in length. For about fifteen days the eggs are carried about by the female, attached to the fine hairs of the swimmerets on the under side of the abdomen. At this period the female crab is said to be "berried," or to be carrying a "sponge."

At the end of fifteen days the eggs hatch, releasing tiny "zoeae." A zoea is about one twenty-fifth of an inch in total length, and bears some resemblance to a mosquito "wriggler," although, of course, much smaller. The second stage, the megalops, approaches the crab-form a little more nearly, but it is not until the third stage is reached that the creature begins to look like the adult. From this stage on, the development is marked by a series of moulting periods. Each moult comes when the animal becomes too crowded in its old shell and must cast it off for a new one. A blue crab requires about fourteen months to reach maturity.

What Is a Deodar?

By FRANK THORNE

EVERYONE who is of the Kipling-reading age (and few and unfortunate are those who outgrow that age entirely) has read of deodar trees. In every one of Kipling's tales where the scene is laid in the hills of India, there is some mention of deodars; and many of us, who have not had the good fortune to travel that far, have wondered what manner of trees they may be.

THE DEODAR

Deodars are cedar trees, closely related to the famous cedars of Lebanon mentioned in the Bible, and to the Atlas cedars of the mountains of northern Africa. Indeed, these three species are the only genuine cedars in the world; the so-called red cedar of America is really a juniper, and the white cedar is an arbor-vitae, while the tree called cedar in California is related to the cypress family.

Deodars are large trees, comparing in size with the spruces of our Pacific Northwest, and they resemble the spruces and firs somewhat in general growth and habit. In one feature, however, they differ sharply. The ends of the branches and the "leader" at the summit of the tree, instead of being firm and straight as in the spruces, are slender and flexible and always droop somewhat. This may be clearly seen in the specimen shown here, a young tree photographed in a park in the city of San Diego.

The leaves of the deodar, as well as those of the other two species of cedar, resemble those of the larch or tamarack more than they do those of the spruce or fir. They are soft and flexible, and are not borne singly along the twigs, but on special short spurs, as in the larches.

The deodar and the other cedars thrive perfectly in the mild climate of our Pacific Coast States, but they would probably not be hardy north of Louisville or Kansas City in the interior of this country. Along the Atlantic Coast, however, they could be grown considerably farther north, with little or no difficulty.

Insect Burglars

(CONTINUED FROM PAGE 12)

service for the plant, but they have also injured the flowers in such a way that other bees are not likely to visit them. Certainly we may call such burglar-bees unlawful visitors, even if we cannot put them in prison.

We must not think of these bees, however, as being morally wicked. We cannot suppose that the good bee which carries the pollen really knows that it is helping the plant. Nor can we suppose that the burglar-bee which steals the nectar really knows that it is hurting the plant. The burglary seems to be simply a case in which the flower and the insect are not in harmony.

Such burglaries occur in many flowers besides the columbine. The curious little pedicularis of barren fields, the beautiful flowers of the squirrel corn, the hanging blossoms of the jewel weeds, the closed tubes of the honeysuckle—these and many other flowers are attacked by insect burglars which rob them of their nectar.

The Plant That Clothes the Island

By N. TOURNEUR

FEW PEOPLE give more than a careless passing glance to it. Yet without its help many an island would have remained a bare volcanic rock, grim and barren. It is the humblest of plants, and in the order of nature comes first. But it is one of the farthest travelers, for the minute dust of it, which holds the life out of which the plant springs, is taken thousands and thousands of miles by the winds and waters. Usually it is a dry, leathery-looking thing of very insignificant appearance, although there are islands which it covers with colors like those of an artist's palette, before he has mixed up his shades or tints.

It is in itself a wonder of the microscope. Put a piece of it under a fairly strong magnifying glass, even, and you see a mass of cells, a number of tiny tubes of the thinnest tissue, holding spores or minute germs of life, an outer and an inner layer. When it seeds these spores blow away in the form of a very fine dust; and this dust seems capable of existing almost everywhere.

It falls on the bare and rugged island which has been thrown up from the sea bottom by volcanic action; and through its work the sterile and forbidding rock becomes clothed with vegetation, then decked with flowers and shrubs, and adorned with a growth of trees.

It is the lichen with the dusty seed that clothes the island first. Without its feeble means the rock would remain bare. This lichen, by nature's means, goes before all other things. It fastens on the rocky surface, and grows there, clothing it with its first coat of vegetation. Then it gives place to another of its kind, the leafy lichen, the foliaceous species, which gives place to the liverwort—a plant between the lichens and mosses—and the liverwort gives place to the mosses. In time, these decay; the wet and the weather tear them away from the rocks and mix them with the detritus—the particles worn off or detached from the rock by wind, weather, and friction—which the elements bring down; and the beginning of a soil is already in process of being formed.

Then the wind-carried or water-borne seeds rest on the island, and the second step has been taken by nature; and, after this, the progress is continued. Birds settle on our island, and they fetch seeds in the food their bodies contain; other arrivals come; and every tempest brings a new plant. The zoological immigrants arrive; the winds and waters and birds carry additional products; and the once barren and formidable heap of rocks becomes a fertile and green-clad island.

It was the pulverulent or dusty lichen which laid the foundation of it all.

Nowhere is there a finer display of leafy lichens than on Kerguelen's Island, that lies in the sub-Antarctic regions, and is more remote than any other island from the nearest continent. The rocks there are painted, as it were, with them. At the tops of the hills they look like forests, most of them being as large as little oak trees. Down to the edge of the sea, the cliffs of Kerguelen are bedecked beautifully with black, lilac, yellow, and light red lichens. In human life, most lichens are of little importance. But, as regards nature, how vast is the purpose they carry out!

Oddly enough, this apparently worthless plant is of worth as a life saver.

In Lapland, where in the pine forests the surface of the soil is completely carpeted with it for many miles, the folk make of it a kind of bread; as do the Norwegians along the frontier. That the lichen has an extraordinary vitality is evident, when by an accident the forests are burnt to the ground; in a very short time the lichen reappears, and soon takes on all its strength of growth.

The Icelanders beat up the cetraria or Iceland moss, a species of the lichen, and cook it as a cake and eat it with milk. We, on the other hand, buy Iceland moss in the shops as medicine. The Icelanders are thankful to Providence, which in their inhospitable regions sends them, as they say, "bread from the very stones."

Again, in Canada, many a trapper has been glad to keep alive on the "tripe de roche"; a lichen that has often saved the life of the winter-bound hunter and explorer.

In Turkestan, too, and Kurdistan, there is a species of lichen, which grows very abundantly, upon which the wandering tribes support themselves in times of necessity, shredding it into a potful of fat, and stewing it therein.

The well-known chemical test called "litmus" was first produced from the common orchal lichen; and others of the species have made contributions of yellow, red, and true blue dyes.

All in all, the lichen, first in the family of nature, and the most humble, is one of the most important of earth's organisms.

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Names in Nature

EVEN the most familiar of the garden flowers may have names which do not seem to explain themselves. To such extent is this true that sometimes the expert in flower raising may be puzzled as to the origin of a name. Take the geranium, for example. On the surface there may not appear to be close relationship between the geranium and the powerful hoisting cranes used for lifting locomotives and other articles of great weight. Consultation of the authorities shows, however, that the flower and the massive mechanical device derived their names from a single source. The origin of "geranium" was the Greek word "geranos," meaning the "crane" of the Class Birds. The flower took its name from the fact that its seed capsules have a long, projecting beak—described as "a beak-like torus or receptacle around which the seed capsules are arranged." The resemblance to the beak of a crane causes the geranium to be commonly known as "crane's bill," and sometimes as "stork's bill." A kinship not so familiar is found in the name "crane's bill" as applied to a pair of slender forceps used by surgeons. The mechanical "crane" took its name from the resemblance of its long arm to the neck of the bird known as the crane.

GERANIUMS AND CRANES

The name of the common bumble-bee has brought forth many discussions. Some people insist that the word should be "humble-bee," while others, more precisely scientific, demand "bombus-bee." There is no reason for the advocate of either spelling to apologize. The bee belongs to the genus Bombus, and the name of the genus is derived from the Greek "bombos," translated into English as meaning "a buzzing noise." Skeat, the distinguished English etymologist, defines the bumble-bee as "a bee that hums," and adds that the verb "bumble" is from the old Dutch "bommelen," a verb which means "to buzz" or "to hum," and which he says is akin to the word "boom" as applied to a "booming" sound. "As both boom and hum signify to buzz," explains Skeat, "the insect is called indifferently a bumble-bee or a humble-bee." It is of interest that the explosive "bomb" appears to have derived its name through imitation of the "booming" sound of its explosion, and that the bumble-bee is a kinsman of the bomb; which is a kinship easily believed by anyone who has been the victim of the explosive tactics of the bee of the genus Bombus.

BUMBLE-BEE AND BOMB

Defoliator of Shade Trees

The tussock moth has been nominated for the job of chief defoliator of shade trees in many eastern towns and cities. The destructive caterpillars of this moth are at the head of the list of pests in their class. They are twice unwelcome because of the unsightly appearance caused by the plastering of cocoons and egg masses on the trunks and larger branches of trees and on adjacent buildings.

There are two broods of the moth each year in Pennsylvania and nearby states, the first appearing in May. The insect spends the winter as an egg in conspicuous, white, foamy egg masses which contain from 100 to 400 eggs. The eggs hatch in May and the small caterpillars feed on the underside of the leaves. As they increase in size they eat the larger portions until all but the largest veins are devoured. They prefer leaves of poplar, horse chestnut, soft maple, elm, linden, and most varieties of fruit trees.

They may be identified easily as the caterpillars are of striking appearance, being marked with beautiful colors and long black plumes. A pair of plumes protrude over the bright red head and a single plume rises from the opposite end of the body. A broad black band, bordered with yellow, extends the full length of the back. Four white brushlike tufts of hair, or tussocks, stand upright in a row on the back, and from these the moth derives its name.

These destructive pests may be controlled with relative ease. A thorough spraying of the foliage with lead arsenate, 1½ pounds of the powder to 50 gallons of water, during June, will destroy the first brood. A second application in August will clean up the second brood if the first spray does not completely answer the purpose. Scraping off and burning the egg masses is another means of control. A sponge soaked in crude creosote, mounted on a long pole and pressed against the egg masses, is also an effective treatment. Banding trees with sticky substances is not considered a satisfactory means of controlling this insect.

The Marabou Stork

An interested correspondent from Zululand, South Africa, gives us some information in regard to the marabou stork. He says that the valuable feathers are obtained not from under the wings of the bird but from under the tail. While writers have referred to the "sacred" character of the marabou, this sacredness seems to lie chiefly in his kingship over all of the vultures. King Marabou, at least, has a high opinion of the sacred priority of his rights as opposed to any other member of the vulture tribe and his great size and formidable beak offer an effective support to his claims.

Forestry Bill Passed

THE MEMBERS of the American Nature Association and the American Tree Association are to be congratulated on the passage by Congress of the McNary-Clarke Forestry Bill. Having been passed by the House of Representatives on April 23, it was taken up by the Senate and put through on June 6, the next to the last day of the session. NATURE MAGAZINE *for April carried a special appeal for the bill as the first real step toward a national forest policy, thus no longer leaving the United States as the only important nation in the world without a definite national forest conservation plan. The interest and activity of our members and their response to the Association's appeal proved an important influence.*

Bird Protection in South Africa

Bird protection in South Africa has many practical and forceful supporters. It has recently been shown how nearly $25,000,000 a year is at present lost to South Africa by devastating insects, which the birds, if preserved by law and a humane spirit engendered in the children, would decimate. In South Africa, as in other countries, there are bird pests and bird friends, and the difficulty of distinguishing between them is a problem of popular education. There it is not only a matter of protecting the stock animals and the crops, but of protecting human beings against the diseases carried by insects. It is pointed out that the blood-sucking flies, which infect men with the sleeping sickness or tsetse disease, are eaten by many birds.

A Helpful Knocker

Woodpeckers make a lot of fuss, but while they are knocking on wood they are searching for meat. According to the Pennsylvania Bureau of Plant Industry, they play an important part in destroying the round-headed apple-tree borer. Soon after these borers hatch, the woodpeckers find them beneath the bark and start right after the worms, continuing to drill for them as long as the borers are in the wood. In several orchards where counts were made, 50 to 75 per cent of the borers had been destroyed by the woodpeckers.

Trees Tell Tales

Only recently given the responsibility of the new office of State Forester of Alabama, Major Page S. Bunker, in company with several members of the United States Forest Service, is already engaged in the work of convincing the people of Alabama that trees tell tales of safeguarded water supplies, beautiful communities and valuable forests, or of barren acres, unsightly towns and an impoverished country. He is to do this through the medium of a motion picture now being filmed to show the condition of the forests of the state and the problems they present. This film will be available to all schools and organizations interested in foresty in the state.

War on Caterpillars

Officials of the city of Wilmington, Delaware, recently joined forces with farmers and truckers of the state in waging warfare on the caterpillar pest, when a plea was made for property

owners to cut down all wild cherry trees on their land. According to the city forester, tent caterpillars are threatening the destruction of all vegetation in this section of the state. Similar action is being taken this year in may sections of the country, as the pest seems to be particularly bad. Extremes of destruction demand extreme remedies, but if every home and property owner would make it his business to destroy the great webby nests early in the season, or burn them in the evening when the denizens are at home, the damage would be infinitely lessened. Nature clubs, public schools and many other organizations have this year been offering prizes for the destruction of these nests and the school children have responded readily. Here is a simple principle of education and conservation which can be widely followed.

Forests and Water Supply

The Charles Lathrop Pack prize for the best essay on the public aspects of forestry was awarded to Mr. Lloyd B. Gilmour, of the Class of 1924, of the New York State College of Forestry. After emphasizing the recreational and aesthetic features of forest areas, Mr. Gilmour showed in a very clear way what forests mean to the maintenance of city water supplies and national water power and electrical development, while he points out that the electrification of railroads thus made possible, in itself reduces the hazard of forest fires. It has been said that as long as the sun continues to draw water and as long as this moisture is precipitated in the form of rain, hail or snow, water power is inexhaustible. Mr. Gilmour points out the falsity of this theory and shows that in reality water supplies are exhaustible just so long as our forests are exhaustible, for, while water runs off bare slopes in veritable floods and causes untold damage, the dry season always follows. It is the forests which avert these floods and produce regular stream flow. It is the forests which keep the water cool, fresh and clear. It is a fine thing that the prize essay idea is beginning to show its value in convincing us that all conservation is related. Man ever interferes with the balance of nature at his own risk.

A New National Monument

Various organizations are uniting to demand the setting aside of Glacier Bay, Alaska, the location of the famous Muir Glacier, named for the great naturalist, John Muir, as a national monument. It is being pointed out that our present national park system contains no example of a tidewater glacier, while the proposed area includes nine of the finest and most accessible glaciers in Alaska. Here are also examples of the magnificent coastal forests, relics of ancient interglacial forests, and a wealth of material for mineralogical study. This is a conservational project in which every good American citizen should be interested and for which he should put himself on record with the Secretary of the Interior and the Director of the National Park Service at Washington.

Eagles for the Eagles

The National Fraternal Order of Eagles, through its various lodges, has actively taken up the campaign for the protection of our national bird. A number of resolutions have been passed and sent to the editor of NATURE MAGAZINE. On the other hand, an organization known as the Pioneers of Alaska seems to feel that Alaska should be for the Alaskans and that they should have the right to kill as they see fit. Anything that does not yield to domestication must go. Reference is made to the killing of young fawns by the eagles, but the Alaskans equally do not desire further restriction on the killing of deer. This is the spirit of developing the country and making money quickly. It is the same spirit which has so often actuated the American pioneer and should not be misunderstood. He is entitled to his point of view, and we owe a great deal to him. Nevertheless, there are those who feel that the pioneers of our West were not originally fair or just to the American Indian and that their very actions brought on many of the subsequent troubles. Man, in his struggles to conquer the wilderness, must necessarily destroy great quantities of wild life. We do not criticize him for cutting down the forest to make his farm or for protecting that farm after it has been made. We do believe, however, that some distinction should be made between defensive destruction and a campaign of extermination.

Klamath River Menaced

Mr. F. M. Newbert, of the California Fish and Game Commission, has been active in circulating an initiative petition to prevent the building of three large commercial dams on the Klamath River, on the ground that this river is the greatest salmon and rainbow trout stream in California. It is from the Klamath River that the Fish and Game Commission takes almost all of its salmon and wild rainbow trout eggs for its hatcheries, thus enabling it to stock over 25,000 miles of streams and hundreds of lakes in California. The appeal is based not only on theoretical grounds, but upon a practical study of the fish resources of California, and endeavors to point out that the proposed commercial development, through the building of dams, prejudices not only recreational opportunities but actually injures one industry for the benefit of another.

Two Good Examples

The spirit of natural resource conservation is gripping many just now, and reforesting is being undertaken not only by private owners of land, but also by towns and cities of our commonwealths.

In Athol and Framingham, Massachusetts, town property is being reforested; in the former town, 10,000 white pine seedlings will be put in on the Town Farm this year, and the same number of pine and spruce seedlings next year, and the following year 10,000 white pine seedlings, 30,000 in all. In addition, five days will be spent in reforesting the Newton Reservoir property this year. In Framingham, 57 acres are to be reforested. Five thousand red pine and 5,000 Norway spruce will go in on the Town Farm this year, and each following year 15,000 white pine will be set until the entire acreage is covered. Pride in the coming forests is being exhibited by these communities, and this augurs well for such enterprises in the future.

Arboretum at the Capital

An opportunity exists at the nation's capital to obtain the necessary property for a thoroughly adequate arboretum for various species of trees, shrubs and plants. Dr. David Fairchild, of the U. S. Department of Agriculture, has for years been engaged in special work leading towards the introduction of an enormous number of plants, trees and shrubs, both useful and ornamental. Dr. Fairchild is in charge of the foreign seed and plant introduction department. He especially endorses the proposed arboretum plan, inasmuch as there is no place at the capital where these new and interesting species may be even so much as represented. This is a splendid movement which should have national support.

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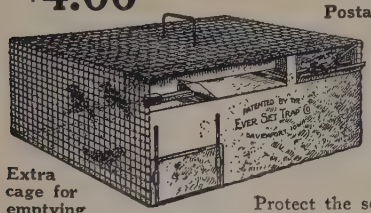

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(CONTINUED FROM PAGE 15)

in our northwestern states, excessive crow concentrations may embrace even larger areas, in which a reduction in numbers would be a benefit to agriculture during some seasons of the year. Does this, however, indicate that the birds should be reduced throughout their range and be killed at all times or over great areas where they are inflicting no appreciable damage and may even be doing the farmer a distinct service?

Take for instance the relation of the crow to the corn crop, through the medium of which the farmer most often gets an insight into the bird's capacity for harm. About 38 per cent of the adult crow's annual food consists of corn; it is the bird's staff of life. About two-thirds of this, however, is simply waste grain gleaned from scattered ears mainly during the winter months, leaving about 13 per cent of the crow's annual food that may have been pilfered from the sprouting or ripening crop. The assumption is made in this computation that practically all the corn eaten during the sprouting and ripening periods should be credited as a loss. That some of the grain eaten during these periods also may be waste is evident from the fact that in the month of June, when there is practically no growing corn to be damaged, the crow makes over a fifth of its food of that grain. But even on the basis that 13 per cent of the crow's food has been secured from the growing crop, let us appraise this work.

To make a concrete illustration let us apply these estimates of food to a small field of corn, and, to make computation easy, we may assume that crows have destroyed an even 13 bushels of corn in it. What recompense has the average farmer received for such a loss? In what way has the crow saved this crop from losses possibly much greater than those represented by 13 bushels of corn? From this hypothetical field the crow has removed 4¼ bushels of May beetles, white grubs, and related insects, 3 1/3 bushels of grasshoppers and crickets, over 1½ bushels of caterpillars, 1½ bushels of ground beetles (some of which are beneficial forms), and 4¼ bushels of miscellaneous insects including injurious, neutral, and some beneficial species, a total of nearly 19 bushels. I am perfectly willing to leave to the decision of the owner of this hypothetical field whether he would prefer to have 19 additional bushels of insects, mostly destructive forms and their progeny, at work in his field throughout the growing season, in place of the 13 empty bushel baskets that represent the ripening or sprouting grain taken by the crow.

It is the possibilities for good in just such situations as this which may occur anywhere throughout the crow's range that brings home the realization that indiscriminate crow destruction is not wise. Bird control,

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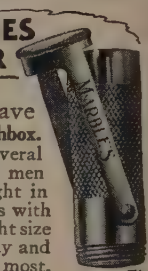

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above all other problems with which the farmer is confronted, must be carried out intelligently and with discretion. In the case of the crow a campaign of indiscriminate and nation-wide destruction for the purpose of better crop protection is comparable to an orchardist who, aiming to remove surplus fruiting buds, arms himself with an axe and saw and then, blindfolding himself, starts to work. He would do a very effective job "in spots."

The whole problem of curbing the objectionable activities of some forms of bird life is increasingly attracting attention as the interests of man and the long-established habits of the birds come in conflict. It is one that must be met and solved through processes of earnest study and the sober consideration of a multitude of factors that are bound to arise. Hysteria and organized propaganda have no place in the consideration.

That the cure may be worse than the disease in efforts of the latter type may be illustrated by some aspects of the nation-wide anti-crow campaign that has been conducted by an ammunition company. Rewards have been offered totaling $2,500 for the destruction of crows and other birds and animals. Aside from the direct economic losses involved in the destruction of crows in localities and at times when they may be engaged in pursuits beneficial to agriculture, another very important factor has been injected. This campaign called for a nation-wide hunt from March 15 to June 15 of this year. It meant, if we are to believe statements coming from those who fathered this enterprise, that many thousands of hunters throughout the country were in the field during the breeding season for game and insectivorous birds. That these birds suffered there can be little doubt. It is inconceivable that human nature, as exemplified in the average hunter who goes afield at that time of the year, would show such a reversal of form that the American people could feel certain that they had left the task of adjusting the relationship between man and crow in safe hands. What assurance have we that the agents of this enterprise, whose principal qualification is the possession of a gun and a supply of ammunition of the proper brand, have carried out the work with solemn regard for the well-being of other wild life?

Furthermore, what chance is there of proper game law enforcement if the excuse for shooting a crow will afford a universal, logical, and sufficient reason for being afield? Experienced administrators of game laws realize the added difficulties of such a situation. In fact an anti-crow campaign conducted in this manner might well be looked upon as one of the most disastrous blows at efficient game law enforcement since the passage of the Migratory Bird Treaty Act simplified warden service by putting a stop to spring shooting.

And yet, aside from these specific ob-

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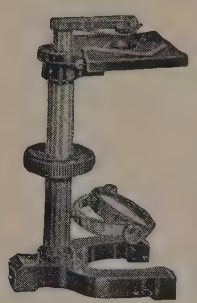

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jections, is there not something still more fundamental at issue in a situation of this kind? Organized and privately financed propaganda, with all the import that usually goes with that word in current usage, has been invoked to formulate public opinion regarding the economic position of a wild creature—a matter in which sound economic principles and logical scientific reasoning alone should prevail. Distorted data, information obtained from a distinctly different species of bird under peculiar local conditions, and the lurid presentation of one side of the question to the utter exclusion of the other, are some of the characteristics of this effort to sway public opinion. Are we to allow our attitude toward matters of bird control or bird conservation to be formulated by such influences, or is it to be guided by the results of thorough and scientific study by the agencies of our Government to which such activities have been delegated?

I shall repeat what has been said previously, that under a variety of situations, crow control is justifiable and even necessary. It is, however, a problem that, along with other problems that arise in connection with our wild life, calls for sober thought, logical reasoning, and careful administration. At all times control measures should be in hands of those who can give us constant assurance and guarantee of such procedure. Loose thinking, distorted data, unsound propaganda, and irresponsible conduct of campaigns have no place in such an undertaking.

Evening Skies in July

(CONTINUED FROM PAGE 16)

ance and brightness. Not so this summer, however, when Mars will be nearer to the earth than it has been in considerably more than a century. When Mars comes nearest to us on the twenty-second of August it will be less than thirty-five million miles from the earth and brighter than the planet Jupiter. Mars is not yet visible at the time for which our chart is made out, but it will appear soon above the southeastern horizon.

There are now two planets beautifully in view, though, Saturn near Spica in Virgo in the southwest and Jupiter near Antares in Scorpio in the southeast, now the brightest object in view. Venus, which has delighted us with its beauty the past winter and spring in the western sky, is now too close to the sun to be seen. On the first of July it passes from east to west of the sun and before long will be seen in the east before sunrise.

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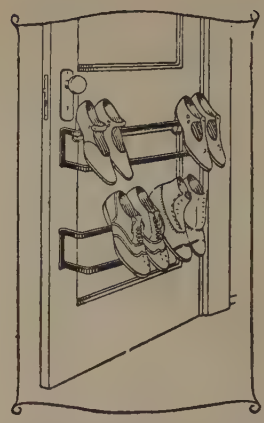

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Baby Panthers at Play

(CONTINUED FROM PAGE 7)

understand man better than he understands them. They are quick to catch the meaning of kindness, but quicker to scent any indication of danger.

At the end of the two months, the children were so attached to the cougar kittens that they didn't want to let them go back home. We had but half a story. As they grew older, would they have been tame and reliable; or would they have changed in disposition?

The Apple Mouse

(CONTINUED FROM PAGE 53)

expert. Lose no time." No time was lost; the work took many days, but most of the trees were saved. A few died, and all were slow in recovering.

There was lost time, lost capital, and smaller returns next fall, but Farmer Pippin had learned a valuable lesson. The Apple Mice would not catch him napping next winter.

NOTE: The apple mouse, better known as pine mouse, lives in most of the eastern states west to Kansas and Nebraska, and some years causes heavy losses among apple and other fruit trees. See Farmers' Bulletin No. 670, "Field Mice as Farm and Orchard Pests," and Bulletin No. 710, "Bridge Grafting of Apple Trees," United States Department of Agriculture.

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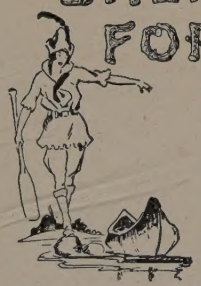

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Nature Put the Eat in Wheat

By C. H. WOODWARD

Nature put the eat in wheat and man has taken it out. He is paying the awful price of disease and death for the interference with nature's law.

Mankind removed the eat from wheat through sheer ignorance. He must put it back or die.

Man assumes to think he can juggle with the law of life and not be punished. He needs but to open his mouth to prove his punishment, evidenced by his decayed and decaying teeth. There are not enough dentists to even reasonably take care of the rotting teeth of mankind. Dental disease is increasing.

The dental offices are filled with suffering humanity having teeth extracted because their rotting presence fills the body with aches and pains.

But taking out the teeth is not dealing with the fundamental cause. It is merely removing one effect to relieve another, and the *cause* of the decaying teeth *goes on with its deadly work!* Diseased tonsils, nasal obstructions, adenoids, impaired vision, irritability, stomach ulcer, constipation, cancer, tuberculosis, palsy, gall-stones, pneumonia, typhoid, high blood pressure, low blood pressure, rheumatism, neuritis, asthma and all the other named manifestations of altered function are traceable directly or indirectly to this fundamental cause—failure to implicitly obey the law of life, the immutable decree of the Creator.

The five fundamentals of all life are: Food, air, water, sleep and exercise. Deprive any living creature of any of these and death inevitably results. Unnatural sleep creates disease, just as does unnatural air, or unnatural water, or unnatural food, or unnatural exercise.

Man *demands* natural air, natural water, natural sleep and some natural exercise, but *actually creates unnatural food.*

Man creates disease. It is unnatural.

The simple law of life is replenishment, and replenishment simply means putting back into the blood-stream the identical elements in kind that have been taken from the blood by the life-cells of the body in the processes of life.

Every one of these elements is found in a *natural* grain of wheat. They are found in no other single substance in nature, except the fertile earth. A handful of fertile earth, a human body and a natural grain of wheat *contain identically the same elements.*

Some of these elements are found in *all* natural foods in the vegetable kingdom, but they *must be natural.* That means nothing shall have been removed or lost through any preparation or cooking process.

It is not possible to cook any natural substance in the presence of the oxygen of the air without denaturing it—making it unnatural.

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exists for the man who wishes to be his own boss and the owner of a permanent, ever-expanding, profitable merchandising service. It may start with $100 capital, or $10,000, but it cannot start without capital. The degree of success has no reasonable limit. It has attracted to it and has today engaged in it, men who are conspicuous successes and of long and wide experience in merchandising, with capital abundant for all their requirements; and the other extreme of men and women with limited business experience and qualifications, and very small capital.

No man is too big for the business.

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The business is merchandising, but it entails a SERVICE that is unique, intensely interesting—productive of great enthusiasm, and broadly constructive. It makes you the greatest benefactor in your community, town, city, or district, and pays you a real profit for such benefaction.

Service is the foundation of all real success, and this service literally enables you to take time from eternity and put it into the life of man, and make legitimate profits in doing so.

Address WHOLE GRAIN WHEAT CO., 1904 Sunnyside Avenue, Chicago, Ill.

Whole Grain Wheat is the first and the only cooked wheat civilized man ever ate that has not been denaturated through cooking in the presence of the oxygen of the air, because the only process by which this can be accomplished is that under which *Whole Grain Wheat* is prepared and cooked, and it is protected by the United States and Canadian Governments.

It is an invariable law of chemistry that oxygen of the air will unite with a mineral in the presence of moisture and change that mineral into an oxide, and mineral oxides are not found in the blood. The difference between the organic mineral found in a natural grain of wheat and an oxidized mineral is illustrated by the difference between a bar of iron and a heap of rust into which oxidation transforms it. No sensible being would trade a bar of iron for a handful of rust.

No informed being will ever trade a natural grain of wheat for a denaturated grain of wheat. Man only does it because he has not known the dire effect that follows.

Sixty-six million people in this nation are confined to their beds from illness every year. Five hundred million dollars are spent each year for drugs to relieve the aches and pains growing out of this violation of the law of nature.

St. Joseph, Mo., May 20, 1924.

"No doubt you were somewhat surprised at not hearing from me for nearly a year. Well I am still a believer in WHOLE GRAIN WHEAT, and have recommended it to a number of my friends as well.

"You will remember that I wrote you about a year ago stating at that time, that my age was 53, my weight 258 pounds, was working 16 hours a day and had high blood pressure, and rheumatism. I followed your instructions for a while, but seemed to be lacking in mental activity, and of course blamed the diet, and went back on the old diet of ham and eggs, and soon my weight began to again increase, and my blood pressure with it, until last October I was told by my doctor it was either a case of diet or die, so decided to diet, with result that from the last of October to the present time I have brought my weight down to 206 pounds and my pulse and blood pressure are down to normal. I also have cut out the tobacco, of which I was a heavy user at the time I wrote you, cut out pastry and white bread, all condiments, salt (use a little salt), vinegar, and live altogether on vegetables, WHOLE GRAIN WHEAT, and fruits, and using them as advised by you at that time, and you can judge from what I tell you how satisfactory the results are. I am sleeping soundly all night now. Kidney and bladder trouble do not bother me, no rheumatism, no shortness of breath, digestion fine. My waist line was 50 inches, when I went on the diet, now it is 43 inches, and my weight still decreasing. I am not bothered with constipation.

"You are at liberty to use my name and whatever portions of this letter you desire.

"Thanking you again for the kindly advice given me, and wishing you continued success, I remain"

Yours truly,

WM. H. KLECAN.
615 South 16th Street.

Whole Grain Wheat is never sold through grocery stores but only through authorized distributors or direct from the company, because it is guaranteed to reduce your meat and grocery bill 25 per cent to 50 per cent when used twice daily. It comes in hermetically sealed sanitary 11-ounce tins (ample for four servings), and is sold in packages of not less than one dozen (a 24-day supply because regular use is essential to results).

Look in your telephone and city directory for *"Whole Grain Wheat* Distributor" or address *Whole Grain Wheat Co.,* 1904 Sunnyside Avenue, Chicago, Ill. Chicago readers telephone orders, Ravenswood 4101; Canadian address, 26 Wellington Street, E., Toronto, Ont. Toronto readers telephone orders, Main 4489. Advertisement

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